

# The Iron Age

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**The Statue of Liberty Pedestal.**  
The material underlying the foundation of the Bartholdi Statue of Liberty is compact clay, gravel and bowlders. The foundation up to the terrace level—where the pedestal proper begins—is of solid concrete; it is 90 feet square at the bottom, 65 feet square at the top, and 52 feet 2 inches high. In the center of the mass is a well hole 10 feet square. Leading from the sides to the base of the central shaft or well hole are four arched passageways at the level of the parade. Spanning the space between the inside walls of the old fort and the foundation of the pedestal, and carrying the four flights of steps leading to the terrace and also the grassy mound between, is a concrete arch about 3½ feet thick and having a chord span of 49 feet. The pedestal will be built of granite, backed with concrete. The principal dimensions are:

|  |                     |
|--|---------------------|
| From high water to top of sea wall...                | 10 feet.            |
| Top sea wall to foot of fort wall...                 | 23½ feet.           |
| Foot fort wall to ground level at parapet of fort... | 23½ feet.           |
| Parapet to foot of pedestal...                       | 24 feet.            |
| Water level to foot of pedestal...                   | 60 feet 10 inches.  |
| Foot of pedestal to top of pedestal...               | 89 feet.            |
| Water level to top of pedestal...                    | 149 feet 10 inches. |
| Base of pedestal...                                  | 62 feet square.     |

The top of the pedestal is 43½ feet square, and has the corners cut off, making it octagonal. The balcony at the top is 3 feet 7 inches wide in the clear, and extends all around. The loggia is 26 feet 7 inches high, the opening being 27 feet 11 inches wide by 3 feet deep in the clear. The columns are 3½ feet wide, the space between them being 6 feet. On each side of the base of the pedestal will be circular shields carrying coats-of-arms of the several States. The terrace will have a clear width of 15½ feet, while the stairways leading to it will be 10 feet wide. The method of holding the statue to the pedestal is as follows: Extending across the top of the pedestal are six channel-bars arranged in two sets of three each; these bars are directly beneath the corner posts of the main frame in the interior of the statue. Beneath and at right angles to these are six other channel-bars, also arranged in two sets, placed under the corner posts. These bars are 34 feet long, so that each end rests in the masonry to the depth of 3½ feet, the well hole or shaft being 26½ feet square. The channel-bars are 4 feet deep, the web plates are ½ inch thick, and the angles are 4 by 5 inches by ½ inch. The base of each post and the two sets of bars immediately beneath it are united by three bolts 5½ inches in diameter.

A little over 60 feet below is a second and similarly arranged system of girders, 41 feet long, 36 inches deep, with web plate ½ inch thick; the angles are 4 by 5 inches by ½ inch. In the lower system there are only two channel bars in a set. These two systems are joined by four sets of eye-bars, placed as near as possible to the side walls of the shaft. Each set consists of four bars, 4 inches wide by 1½ inches thick. Upon the sides of the statue the upper ends of these bars will be prolonged to join the main frame at the tops of the first and second panels. All bracing within the pedestal will be made of steel. This method of anchoring the statue, says the *Scientific American*, is open to severe criticism. It practically hinges the statue at its base, the first section of the main frame serving as a fulcrum resisting the lateral pressure coming upon any side of the figure. This is the weakest part of the main frame, since it receives no support from the side extensions, which do not reach to the bottom of the lowest panel.

The pedestal was designed by Mr. Richard M. Hunt, the architect; the plan of anchoring the statue was designed by Gen. Charles E. Stone, chief engineer, under whose direction the work is now being carried forward.

A tool for making holes in tube sheets of boilers and in other plate-metal structures has been patented by W. F. Harrison, of Wilmington, Del. The tool is so made as to be readily adjustable for the cutting of holes of different diameters. It comprises two independently-adjustable and laterally-sliding tool-holders, extending through the cutter-head, and provided with cylindrical sockets for the reception of the cutters. A clamping-bar and nut are arranged to simultaneously clamp both the sliding tool-holders. Centrally through the head projects a cylindrical centering pin or bit provided with cutting teeth at its lower end. The cutters are adjusted radially to the center pin to the required distance by means of the slides, and are then clamped in place. A small hole is punched at the center of the opening to be made, and the cutter being placed in a drill press, the central pin will bore a small cylindrical guide opening, while the cutters will cut a channel through the metal concentric with the guide.

The Russell & Erwin Mfg. Co., of New Britain, Conn., are the patentees of a new wire nail. The shank of this nail is not made smooth, but is made in several tapering or conical sections. That is to say, from the point upward the nail widens for a short distance, is then contracted, and again widens. In this way a series of bars are formed, which act as ratchet teeth and prevent withdrawal of the nail except by great force. The wire from which the nails are made is prepared with the projections in a continuous strip, and is then cut, headed and pointed.

## Feeding Boilers at the Bottom.

One of the most important things to be considered in boiler construction, says the *Locomotive*, is the position and arrangement of the feed apparatus, but it is, unfortunately, one of the elements that is most often overlooked, or, if considered at all, only in a very superficial manner. Many seem to think that it is only necessary to have a hole somewhere in the boiler—no matter what part—through which water may be

now more particularly of the plain cylinder boiler, of which there are many in use throughout the country.

Plain cylinder boilers are, as a rule, provided with mud-drums, located near the back end. As a rule, also, these boilers are set in pairs over a single furnace, and the mud-drum extends across beneath and is connected to both, and one end projects through the setting wall at the side. It is a favorite method to connect the feed-pipe to the end of the mud-drum, which projects

produce a large volume of cold water through an opening in the bottom, and what becomes of it? Does it rise at once and become mixed with the large body of water in the boiler? By no means. It cannot rise until it has become heated, for there is a great difference between the specific gravity of water at 60°, or even 212° F., and water at 324°. Consequently it "hugs" the bottom of the boiler and flows toward the front end or hottest portion of the shell. Now let us examine the effect which it produces.

duced through an opening in the bottom, and flows along over these heated plates. If it could produce its full effect at once the contraction caused thereby would bring a stress of  $300 + 15 = 20$  tons per square inch upon the bottom plates of the shell. But fortunately it cannot exert its full effect at once, but it can act to such an extent that we have known it to rupture the plates of a new boiler through the seams on the bottom no less than three times in less than six weeks after the boilers were started up.

The effect in such cases will always be the most marked, especially if the plant is furnished with a heater, when the engine is not running, for then, as no steam is being drawn from the boilers, there is comparatively little circulation going on in the water in the boiler, and the water pumped in, colder than usual from the fact that the heater is not in operation, spreads out in a thin layer on the lowest point of the shell, and stays there, and keeps the temperature of the shell down, owing to the fires being banked or the draft shut, while the larger body of water above, at a temperature of from 300° to 325°, keeps the upper portion of the shell at its higher temperature. It will readily be seen that the strain brought upon the seams along the bottom is something enormous, and we can understand why it is many boilers of this class rupture their girth seams while being filled up for the night after the engine has been shut down. To most persons who have but a slight knowledge of the matter, we fancy it would be a surprise to see the persistence with which cold water will "hug" the bottom of a boiler under such circumstances. We have seen boilers when the fire has been drawn, and cold water pumped in to cool them off, so cold on the bottom that they felt cold to the touch, and must consequently have had a temperature considerably below 100° F., while the water on top, above the tubes, was sufficiently hot to scald; and they will remain in such a condition for hours.

The only thing to be done where feed connections are made in the manner described is to change them, and by changing them at once much trouble, or even a disastrous explosion, may be avoided. Put the feed-pipe in through the front head a few inches below the water line, drill and tap a hole the proper size for the feed-pipe, cut a long thread on the end of the pipe and screw the pipe through the head, letting it project through on the inside far enough to put on a coupling, then screw into the coupling a piece of pipe not less than 8 or 10 feet long, letting it run horizontally toward the back end of the boiler, the whole arrangement being only from 3 to 4 inches below the water line of the boiler, and hot or cold water may be fed indifferently without fear of danger from ruptured plates or leaky seams. In short, put in a "top feed" and avoid further trouble.

## Blooming Mill at the Ebbw Vale Steel Works.

The Ebbw Vale Works have recently completed a blooming mill with balanced top roll, to handle 14½-inch rail ingots, making 6-inch blooms. Mr. Holland has given a description of the mill at a meeting of the British Institution of Mechanical Engineers, and *Engineering* has published a series of engravings, which we reproduce.

The rolls themselves are 36 inch centers, and are shown in elevation in Fig. 1, Fig. 2 being a plan. The blooms are conveyed from the rolls to the shears on live rollers, 24-inch centers and 19 inches in diameter by 13 inches wide. These are driven by a pair of 6½-inch by 10-inch vertical engines, geared 2 to 1. The shears, which are horizontal, are driven by a vertical engine, made at Ebbw Vale, 12 by 15 inches, geared 9½ to 1, the stroke of knife being 10 inches. The arrangement is shown in Fig. 3. Returning to the rolls, we find a new arrangement for turning and carrying the ingot from groove to groove, illustrated in Figs. 3, 5 and 6. The arrangement of rollers on each side of the rolls is also shown in these illustrations. These rollers are placed 26½-inch centers, are 16 inches in diameter, and are driven by a pair of vertical engines, 10-inch cylinders by 14-inch stroke.

The turning and carrying of the ingot is effected by two hydraulic cylinders. The turning or tipping cylinder is 6 inches in diameter by 16 inches stroke. This is shown to the right of the illustrations in Figs. 3 and 5. The piston-rod is connected to a square shaft by a connecting-rod and a crank lever. On the square shaft, which is placed parallel with the rollers, is a loose miter-wheel carried in a bearing on a movable carriage. This wheel gears into a miter-wheel on a shaft carried on a movable carriage at right angles to the carrying rollers. On this shaft are keyed four levers, and three are connected by links to tipping levers which work between the carrying rollers. The carriage on which the levers and their shaft are carried travels beneath the rolls, so as to take the ingot as it passes through each groove. The carriage is traversed by a hydraulic piston 8 inches in diameter by 6 feet 2 inches stroke.

For balancing the top roll two hydraulic rams 10½ inches in diameter are placed underneath the bed-plate of the roll standard, as shown in Figs. 1, 4 and 7. These are

(Concluded on page 17.)

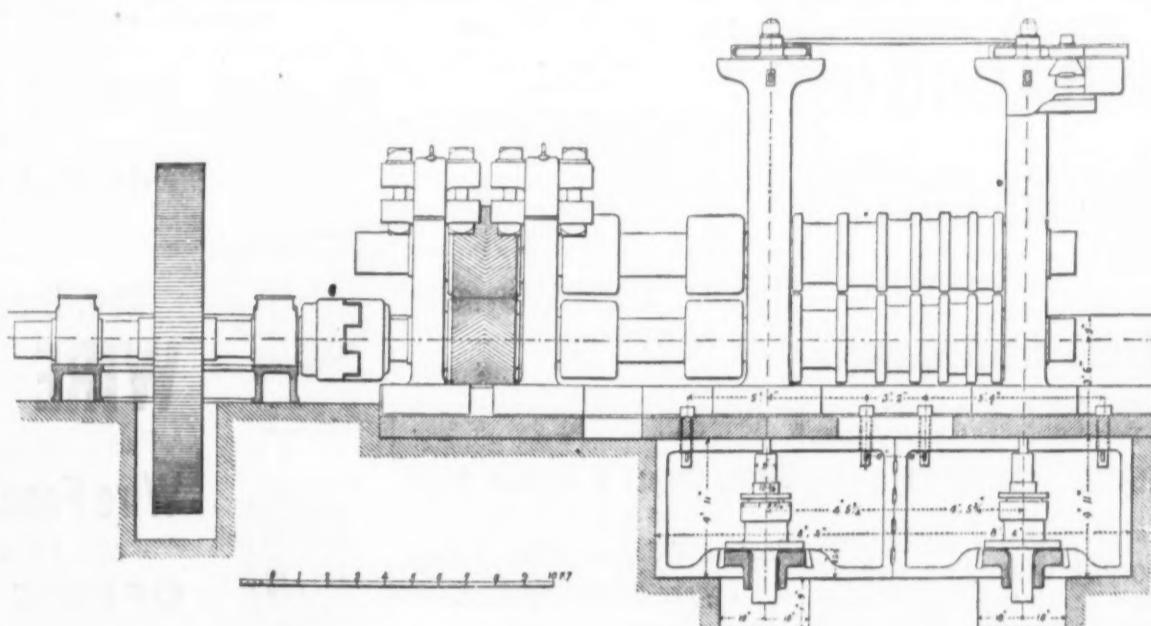


Fig. 1.—Elevation of Train.

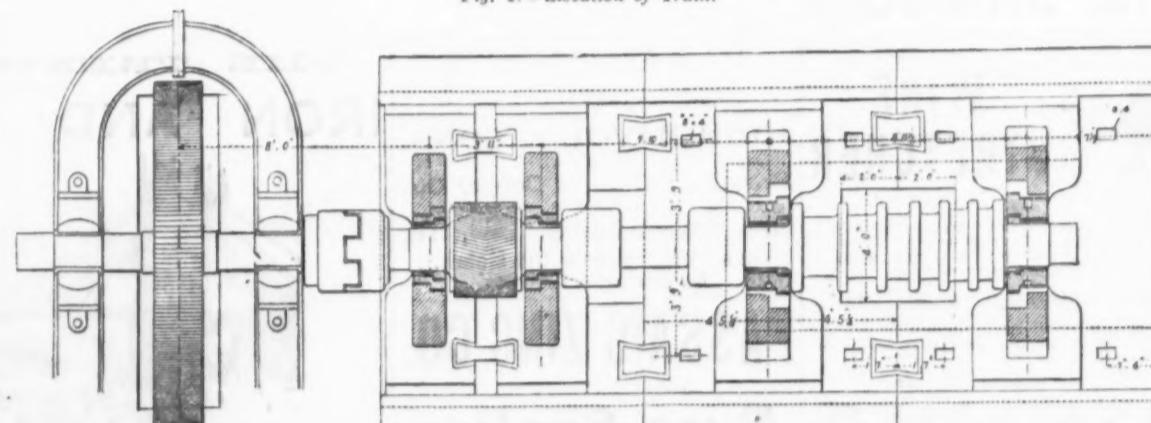


Fig. 2.—Plan of Train.

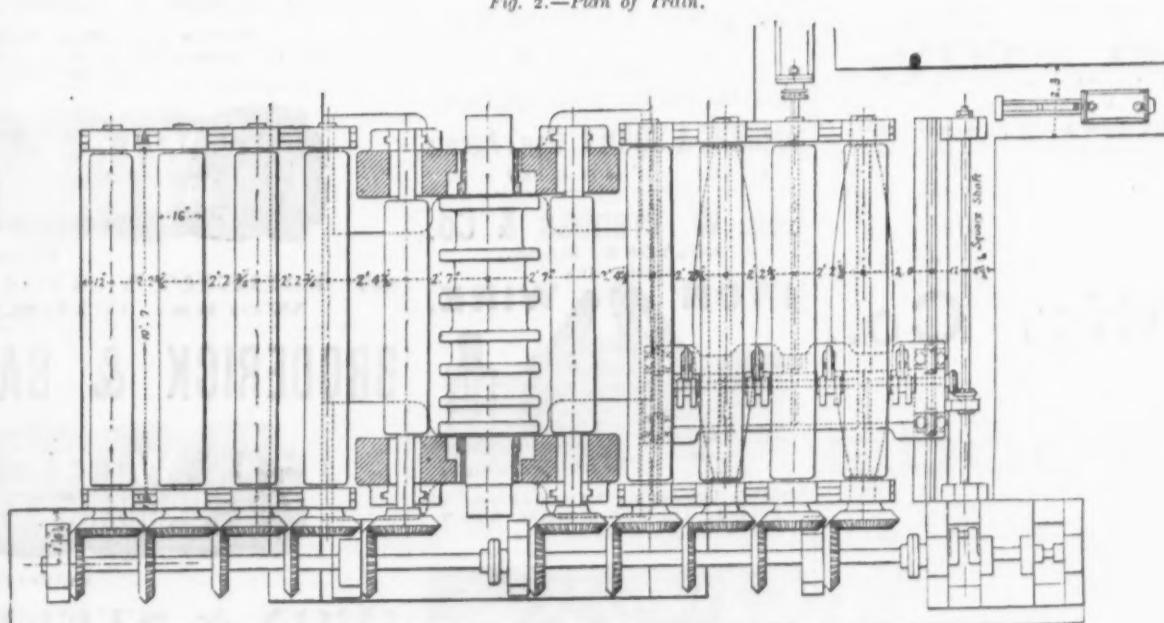


Fig. 3.—Plan of Feed Tables.

## BLOOMING MILL WITH BALANCED TOP ROLL AT THE EBBW VALE STEEL WORKS.

pumped, and we have all that is desired. This is a very grave error. Many boilers have been ruined, and (we make the assertion with the confidence born of long experience) a large number of destructive explosions have been directly caused by introducing the feed-water into boilers at the wrong point. On the location and construction of the feed depends to some extent the economical working of a boiler, and to a great extent, especially with certain types of boilers, its safety, durability and freedom from a variety of defects, such as leaky seams, fractured plates, and others of a similar kind. And it is unfortunately true that the type of boiler which from its nature is most severely affected by mal-construction such as we are now speaking of is the very one which is the oftenest subject to it. We are speaking

through the wall, and here the feed-water is introduced, whether hot or cold, and there is really not so much difference after all between the two, for, no matter how effective a heater may be, the temperature to which it can raise water passing through is quite low compared with the temperature of the water in the boiler due to a steam pressure of, say, 80 pounds per square inch. The difference in the effect produced by feeding hot or cold water at the wrong place is one of degree, not of kind. When a boiler is under steam, of say, 80 pounds per square inch the body of water in it will have a temperature of about 324° F., and the shell plates will necessarily be somewhat hotter, especially on the bottom—just how much hotter will depend entirely upon the quantity of scale or sediment present. Now in-

we know that wrought iron expands or contracts about 1 part in 150,000 for each degree that its temperature is raised or lowered. This is equivalent to a stress of 1 ton per square inch of section for every 15°. That is, suppose we fix a piece of iron—a strip of boiler plate, for instance—½ inch thick and 4 inches wide, at a temperature of 324° F., between a pair of immovable clamps. Then, if we reduce the temperature of the bar under experiment to that of melting ice, we put a stress of 4 tons upon it, or 1 ton for each inch of its width. Now, this is precisely what happens when cold water is fed into the bottom of a boiler. We have the plates or the shell at a temperature of not less, probably, than 350° F. A large quantity of cold water, often at a temperature as low as 50° F., is intro-

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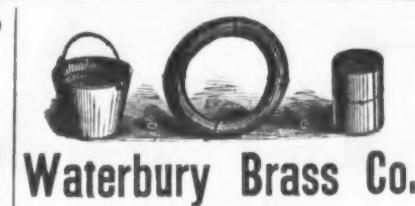
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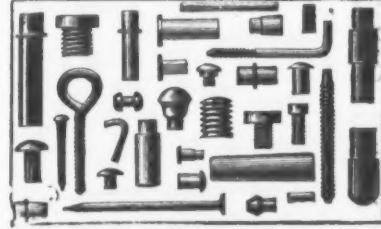
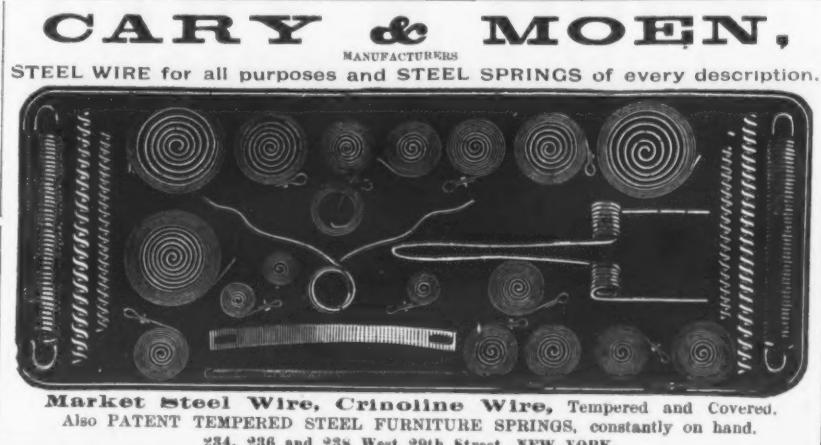
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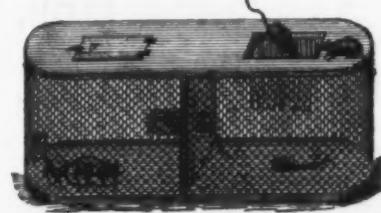
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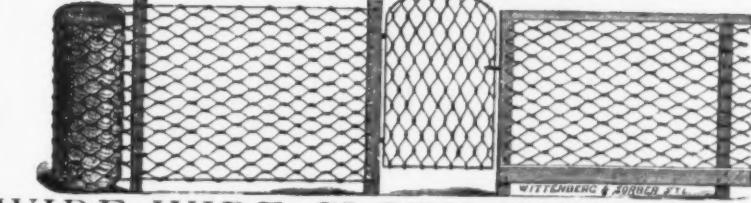
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Modern Automatic Sprinklers.

Mr. C. J. H. Woodbury, of Boston, has been paying a good deal of attention to the subject of the extinction of fires by automatic sprinklers. A paper presented by him before the Society of Arts of Boston contains, after an introductory historical sketch, the following summary of modern developments in this important field:

Mr. Henry S. Parmelee, of New Haven, was the inventor of the first successful automatic sprinkler, but previous to making the sprinkler which has been so extensively introduced he attempted, after the precedent of former inventors, to construct a sprinkler wherein the water was kept from entering the sprinkler by means of a valve which was held to its seat by a lever secured by a link of fusible alloy. His experiments showed that there was an elongation of the link, and therefore a spring was attached to take up the lost motion caused by the stretch of the link, and preserve the thrust against the valve. After thorough and careful work in the endeavor to make a valve sprinkler ready for efficient use under all circumstances of fire, and yet with no liability to leakage, he seems to have abandoned all hope of making a satisfactory valve sprinkler, and used an upright rose head covered by a brass cap soldered below the orifices. Afterward, the revolving head, which consisted of a small reaction turbine, was used, and later the form of the sprinkler was modified so as to allow the direct access of heat to both sides of the soldered surface, and the same construction prevented the body of the sprinkler from being expanded into the cap, as was of frequent occurrence in the original form, where a 1/2 inch pipe was screwed into the middle of the sprinkler. There were numerous difficulties in the manufacture of the sprinklers, especially in regard to the soldering, and the methods which were finally found to be uniformly successful are known to but few persons. The manufacture and commercial development of the Parmelee sprinkler, in the later and improved form, was carried on by the Providence Steam and Gas Pipe Company, which, it is estimated, has put up considerably in excess of 150,000 Parmelee sprinklers. The success of this sprinkler was naturally stimulating to the wits of other inventors, but few of whom accomplished anything of importance.

The manufacture of the Parmelee sprinkler was supplanted by the one invented by Mr. Frederick Grinnell, of Providence, R. I., which was a return to the early idea of making a sprinkler containing a valve keeping the water out of the sprinkler and away from contact with the solder, but it also included certain features which solved previous difficulties and rendered it, unlike other valve sprinklers, a successful device, both in stability and operation. The valve-seat at the inlet to the sprinkler is placed in the middle of a flexible diaphragm, against which a deflector with a serrated edge is held by a pair of compound levers, secured at one extremity by fusible solder. When the levers are released by the fusion of the solder, the flexible valve-seat permits the valve to move without opening until the soldered joint is wholly free, thus avoiding the liability of any leaking water cooling the solder and fixing a partially open valve. There is a distinction of great importance between the operation of the piston-valves which move without opening, and the operation of the valve in the Grinnell sprinkler, wherein the valve keeps stationary against its seat without any change in the relation of parts to each other during the movement preliminary to opening, instead of being obliged to slide along a surface with the chance of either leaking or meeting an excessive resistance. The area of the portion of the flexible diaphragm supporting the valve being greater than the area of the valve, the water pressure tends to keep the valve tight as long as the resistance of the levers keeps the valve in place; when the melting of the solder takes away this resistance, then the water pressure opens the valve. This simple and ingenious arrangement makes use of the same water pressure to keep the valve tight when it ought to be tight, and to force it open when it ought to be open. The soldered joint of this sprinkler is reinforced by a piece of wire in the form of the letter L, which makes a compound joint lying in three planes, and which can be readily inspected for any imperfection in soldering, and is much stronger than a plane joint soldered between two surfaces.

The sprinkler made by the Walworth Mfg. Co. of this city, has an oval link of solder to secure the lever which holds the valve against the seat. The position of the link is such that it could not be struck by any spray of water while the sprinkler is in the act of opening, but this precaution seems hardly necessary, as the solder rings break at that granular state preceding fusion which is sometimes called the critical point.

Of the numerous other forms of automatic sprinklers which have run the gauntlet of the Patent Office I do not recall any of those still offered for sale which possess any points of typical novelty which would warrant their present consideration. Experience has shown, when the valve of the sprinkler is held to its seat in rigid connection with a soldered joint, that the impact of the water, in addition to the thrust of the screw used to tighten such valves, is sufficient to cause such sprinklers to leak in course of time. The exhibition of the early patents for automatic sprinklers has left the fundamental principles of the matter open to the public, and limited the scope of invention to the mechanical arrangements used in the construction of sprinklers.

The method of installation of automatics consists in arranging the pipes in such a manner as to receive the benefit of the greatest of several sources of water supply. An upright main connects to a tank in a tower above the highest attic sprinkler, while at the lower end of this main pipe a further supply is received from pumps or city water. Check-valves in the main pipes from each source of supply, and opening toward the sprinklers, assure that the sprinkler system shall at all times receive the benefit of the greatest water pressure of any of the several sources of supply. A supply of water is insured in this tank by connecting near to the top of the tank for the supply of water re-

A. H. McNEAL,  
BURLINGTON, NEW JERSEY.

FLANGE PIPES.



### CAST IRON PIPES FOR WATER AND GAS.

ESTABLISHED IN 1848.

SINGER, NIMICK & CO., LTD.,  
PITTSBURGH, PA.,

MANUFACTURERS OF ALL KINDS OF  
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### STEEL,

WARRANTED EQUAL TO ANY PRODUCED.

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For Edge and Turning Tools, Taps, Dies, Drills, Punches, Shear-Knives, Cold-Chisels and Machinists' Tools generally.

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For Boilers, Fire Boxes, Smoke-Stacks, Tanks, &amp;c.

All our Plate and Sheet Steel being rolled by a Patented Improvement, is unequalled for face finish and exactness of gauge.

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For Shafting, Spindles, Rollers, &amp;c., &amp;c.

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Iron Center Cast Plow Steel. Soft Steel Center Cast Plow Steel. Solid Soft Center Cast Plow Steel.

Finished Rolling Plow Coulters, with Patent Screw Hubs. Agricultural Steel cut to any pattern desired. Attached Steel Forgings made to order.

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HOGAN &amp; SON, General Agents for Eastern and New England States.

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### Light Steel Rails,

40 lbs., 35 lbs., 30 lbs., 25 lbs., 20 lbs. and 16 lbs. per yard.

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THE  
CELEBRATED

### CROCKER.

Endorsed by the leading Skaters and Rink men of the country.

A trial will convince any one of its superiority.

Manufactured by

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FACTORIES: Minneapolis, Minn., U. S. A.

St. Thomas, Ont.,

L. C. BENTON,

Manager of Canadian Factory. Send for Catalogue, and mention this paper.



MONARCH OF ALL SKATES.

Perfect Action. Handsome Finish. The lightest running Skate in the Market.

Established 1861.  
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**STEEL** Of All Descriptions.  
WAREHOUSE, 99 and 101 JOHN ST., NEW YORK.

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STEEL INGOTS, Best Stock, Furnished to Order.

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Being desirous of securing a share of public patronage, we will endeavor to make our product equal in quality to any in the market.

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We can furnish Forgings of any size, either Iron or Steel, plain, forged or rough, turned any diameter up to 30 inch, 35 feet long.

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ALUMINUM BRONZE, ALUMINUM SILVER AND  
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These alloys are of unrivaled beauty of color, extraordinary tensile strength, and have the greatest power to withstand corrosive action of any commercial metal. We are prepared to furnish them in Ingots, Castings, Rods or Wire. Send for pamphlet.

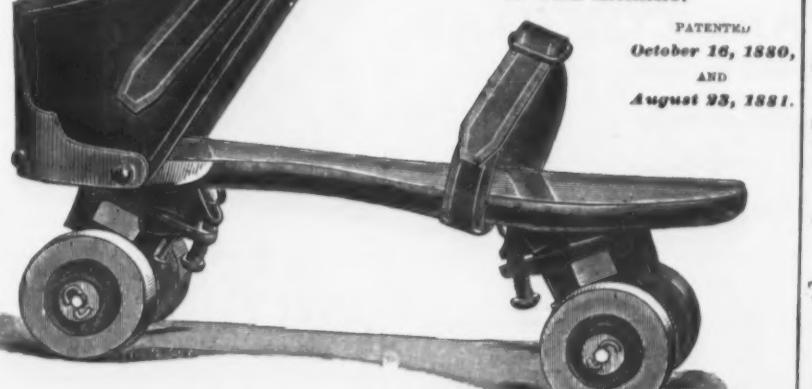
THE  
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THE LATEST AND BEST AND MOST  
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PATENTED

October 16, 1880,

AND

August 23, 1881.

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Boiler Tubes,  
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LINE PIPE.

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In the best, cheapest and most complete Sash Holder and Lock in the market, and we make the largest sale. It holds the window at any point, and locks the same when down, and entirely prevents wind from rattling.

The sole owner of this patent, and sole manufacturer of this fastener, and all persons are hereby notified of this fact. Any parties infringing will be dealt with according to law. Parties who have been buying and selling the "Practical Fastener" so-called, will do well to hear warning. Orders from the trade respectfully solicited.

Circular with price list mailed on application.

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The Woodruff's Patent Celebrated American Patent. Eureka Trough Hanger. The Best in the World. And Pulley for Hoisting Trough. "Little Giant" Combined Shear and Punch. Manufactured by Geo. W. Heartley, Toledo Spring and Variety Works, 300 St. Clair St., Toledo, Ohio.

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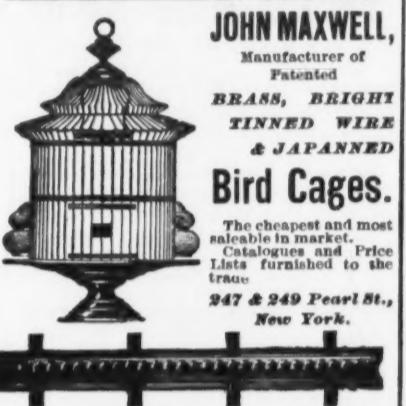
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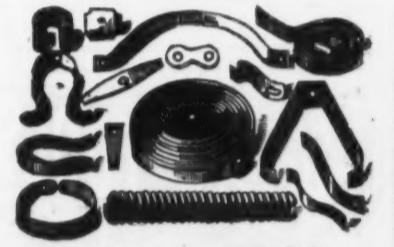
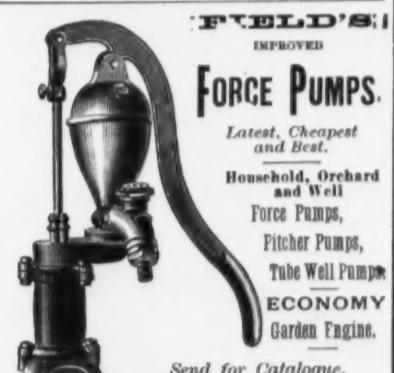
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PUMPS, HYDRAULIC RAMS, GARDEN ENGINES,  
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Pumps and other Hydraulic Machines in the World.

FIG. 120.

FIG. 209.

FIG. 70.

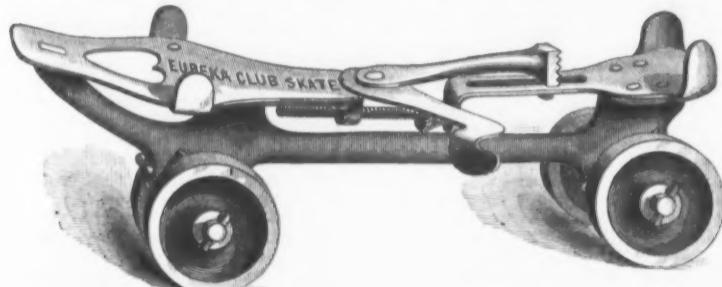
FIG. 120.



Manufacture and keep in stock a full line of FILES and RASPS only for which we claim special advantages over the ordinary goods, and ask domestic and foreign buyers to allow us to compete for their trade.

Superiority acknowledged wherever used, sold or exhibited.

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The above cut represents the "EUREKA" Roller Skate, the **Most Complete and Most Perfect in the Market.** The clamp and foot-plates are made of Steel. **Simple, Durable and Easily Adjusted.**

When fastening this Skate to the shoe, the heel-clamps are stationary. The toe-clamps are drawn together, and the corrugated bar pressed back against the heel simultaneously by one motion of the lever, which is under the instep and cannot by any possibility be thrown out of position while skating, making a most perfect and secure adjustment to the shoe.

**LIST, \$7.00. SPECIAL DISCOUNT TO THE TRADE.**

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This knife is the best in use for cutting down hay and straw in mow and stack, cutting fine feed from bale, cutting corn stalks for feed, cutting peat and ditching marshes.

The blade is best cast steel, spring temper, easily sharpened, and giving universal satisfaction. A few moments' trial will show its merits, and parties once using it are unwilling to do without it. Its sales are fast increasing for export as well as home trade, and it seems destined to take the place of all other Hay Knives.

They are nicely packed in boxes, one dozen each of 10 pounds weight, suitable for shipping by land or water to any part of the world.

MANUFACTURED ONLY BY

**HIRAM HOLT & CO.,** East Wilton, Franklin Co., Maine.

For sale by the Hardware trade generally.

#### CAUTION:

We are informed that various parties are infringing upon the widely known Letters Patent granted originally to George F. Weymouth, for an improved Hay knife.

The characteristic feature of the invention is a curved blade, provided with saw-tooth cutters, and furnished with suitable working handles. It is our present estimate that infringement of our patent, and we have already commenced one suit, which is already ready for hearing, and are about commencing suits against other parties.

All manufacturers are hereby warned of our rights, and the public are cautioned against purchasing any Hay "Saw Knives" which are not of our genuine manufacture.

**HIRAM HOLT & CO.**

EAST WILTON, May 26, 1884.

## DEAN BROS.' STEAM PUMP WORKS.



INDIANAPOLIS, IND.

**NORTHFIELD KNIFE CO.**

Superior Pocket Cutlery,

WITH HAND-FORGED BLADES.



Finest Quality Shears and Scissors,

FULL NICKEL-PLATED.

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## Steel Carpet Tacks.

6, 8, 10, 12, 14, 16, 0z. 37cts. per doz. for Bright or Blued.  
50 " " Tinned or Coppered.  
Discounts, 5, 10 and 2 per cent. for Cash.

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## Nicholson FILES.

Bandsaw Files, Boot Heel, Brass, Cabinet, Cant, Cotter Taper, Cotter Equaling, Cross or Crossing, Doctor, Drill, Feather Edge, Finishing, Flat, Flat Equaling, Flat Wood, Gang Edger, Ginsaw, Gulleting, Half-Round, Half-Round Wood, Hand, Hand Equaling, Handsaw Blunt, Handsaw (Double-ender), Handsaw Taper, single-cut, Handsaw Taper, double-cut, Handsaw Taper, slim, High Back, Hook-Tooth, Knife, Knife Blunt, Lead Float, Lightning, Machine Mill, Mill, Mill Blunt, Mill Pointing, Pillar, Pitsaw, Reaper, Roller, Round, Round Blunt, Sloting, Slim Handsaw Taper, Square, Square Blunt, Square Equaling Files, Stave Saw, Three-Square Files, Three-Square Blunt Files, Tumbler Files, Union Cut, Warding Files, Warding Blunt File, Warding Round Edge File.

## RASPS.

Baker's Beveled Edge, Bread, Cabinet, File, Flat and Half-Round, Flat Shoe, Flat Wood, Half-Round Shoe, Half-Round Wood, Horse, Plain and Tanged, Horse Mouth, Jig, Oval or French Shoe, Racer, Plain and Tanged.

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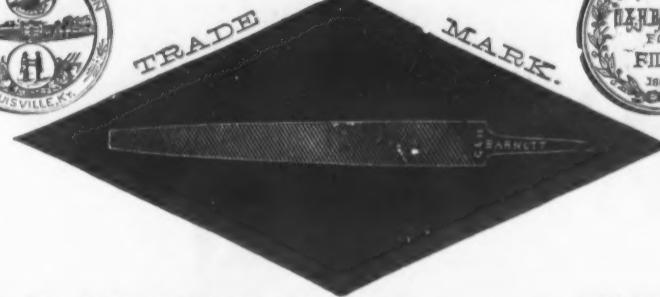
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All descriptions of Files made to order. Price List mailed on application. Established 1863.

**UNION FILE COMPANY,** 309 to 315 North Street.

BALTIMORE, MD., Manufacturers of

## FILES AND RASPS

Made from the Best Refined Cast Steel.

In offering our goods we guarantee to give satisfaction, each being thoroughly examined at every stage of manufacture and tested by an expert before leaving the works.

We are continually increasing our facilities and are prepared to fill orders promptly.

**THRIFT FILE WORKS,**

Manufacturers of all kinds of FILES, RASPS.



**McClellan File Co.,** 113 So. Water St.,

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**PRESSES, DIES AND OTHER SHEET-METAL TOOLS**  
FERRALUKE MACHINE CO., BRIDGEPORT, CONN., U.S.A.

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Manufacturers of the CELEBRATED AMERICAN HORSE RASPS FILES AND FARRIERS' TOOLS.

Made of solid best CLAY CRUCIBLE CAST STEEL of our own manufacture and warranted to be unequalled in the market. For sale by Iron and Hardware dealers throughout the United States and Canada.



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Specially Adapted for Use on Wire Fence.

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CORRESPONDENCE SOLICITED AND ESTIMATES MADE ON

HEAVY MACHINERY, AND ALL SIZES OF FLY WHEELS, PULLEYS, &c.

Special Machinery for Grain Elevators, Grain Steam Shovels, &c., contracted for. Car Wheels and Car Castings at lowest rates.

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**IRON-CLAD ICE BALANCE.**

**JOHN CHATILLON & SONS, NEW YORK,**  
Manufacturers of  
Spring Balances, Patent Balances, Union and  
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**Expanding Mandrel**  
IS THE MOST PERFECT NOVELTY OUT.  
Simple, Inexpensive, Accurate.

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GENERAL MACHINERY AND SUPPLIES  
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Manufacturers, Mills, Mines, Railroads  
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Engines, Boilers, Pumps, Blowers, &c.  
Write for circular and mention this paper.

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LAMP STOVE.  
The People Want It.  
Why Don't You Sell It?  
MANUFACTURED BY  
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Send for prices.

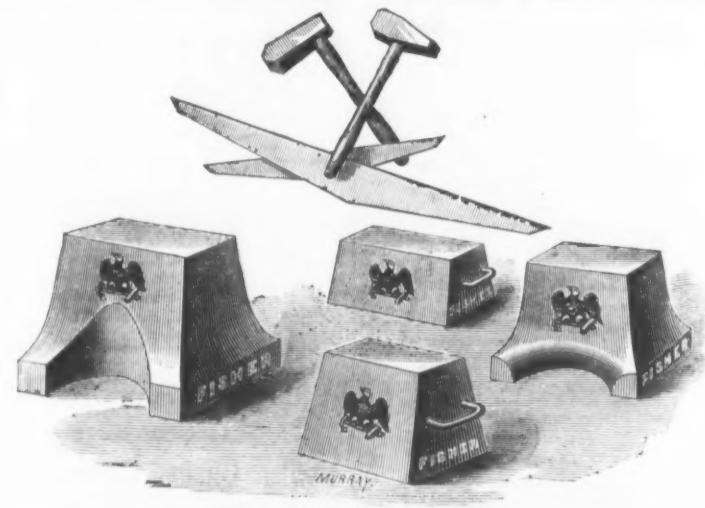
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**Steel Alphabets**  
DIE LETTERS FOR SEAL  
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and C. A. MAYNARD'S  
Trowels, Shovels and Hoes.  
Has on hand some variety  
of Planters' Hoes, oval eyed  
and handled Hilling, Bog,  
Onion and Field Hoes, Shovels  
and Trowels, also Brads' and  
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Manufacturers of  
R. R. Track Scales, Hay Scales, Coal  
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Scales, Counter Scales, &c.  
Send for price list, stating what you want.



**THE EAGLE ANVIL WORKS,**  
TRENTON, NEW JERSEY,  
(Established, 1843.)

MAKE 50 SIZES OF

**SAW-MAKERS' AND AXE-MAKERS' ANVILS,**

For Smithing or Blocking. Warranted Better than any Other Make.

Superior, because face is in ONE PIECE of JESSOP'S BEST CAST STEEL, of uniform, hardest temper, perfectly welded, and warranted never to settle or change from a true surface.

“Cross-Pene” and “Dog-Head” Hammers, of Solid Cast Steel, of every desired Weight and Shape.

Also, STEEL STRAIGHT-EDGES FOR SAW-MAKERS' USE.

**RICHARD DUDGEON,**

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Maker and Patentee of the Improved

**Hydraulic Jacks  
AND  
Punches.**

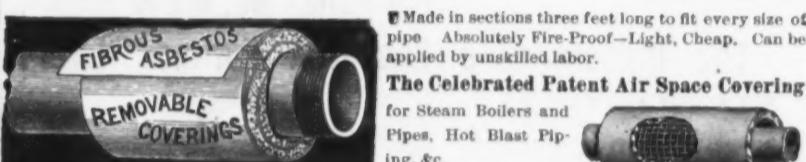
Roller Tube Expanders and Direct-Acting Steam Hammers.

Communications by letter will receive prompt attention.

Jacks for pressing on Car Wheels or Crank Pins made to order.



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Asbestos Materials, Fibre, Millboard Packing and Cement.  
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**THE ESSEX HORSE NAIL CO., LIMITED,**  
ESSEX, ESSEX CO. NEW YORK.

**The Essex Horse Nails**

Are drawn from the best Swedes Iron Rods only. They are hot-forged and cold-pointed, rendering them tough, stiff and easy driving, and are warranted

FIRST-CLASS IN EVERY RESPECT.

All Nails branded “ESSEX” are Fully Guaranteed.

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IMPROVED

**CARPENTERS' TOOLS.**

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**MALIN & CO., CLEVELAND, OHIO.**

Dealers in Steel, Copper, Brass, Tin Plated and Copper Plated Wire,

Manufacturers of BESSEMER STEEL WASHERS.

**PATENT SPOOL WIRE FOR THE RETAIL HARDWARE TRADE.**

Dealers who handle it do away with the **Broken Bundle Business** and sell small quantities by the spool only. It is a convenience for both dealer and consumer. It is **Shellac-Coated** and **cannot rust**; is wound like spool cotton on **Quarter Pound**, **Half Pound** and **One Pound** Spools, one dozen spools to a box. Our spooled Hair Wire is the best in the market.

FOR SALE TO THE TRADE BY

**MALIN & CO.,**

CLEVELAND, O.

AND BY



Exact Size of Quarter-Pound Spool.

**Hardware Jobbers Everywhere.**

SEND FOR ILLUSTRATED PRICE LIST.

SPECIAL WIRES FOR MANUFACTURING PURPOSES ON ANY SIZE OF SPOOL.

**JOHN WALES & CO.,** - - - - - 239 and 241 Franklin St.

BOSTON, MASS.

Eastern Agents.

Manufacturers and the Trade are warned not to infringe on our patent, No. 294,740, either by manufacturing or selling.

the service of the insurance adjusters. If the automatic sprinklers operate so much more promptly that the ratio of claims to losses is less, they are certainly entitled to credit for it. In the record of all fires cited in this connection nearly 39 per cent. are followed by claims, while of the automatic-sprinkler fires alone about 30 per cent. result in an appreciable loss.

Average of fires without sprinkler protection ..... \$7,794.05

Average of fires with sprinkler protection ..... 391.82

Difference ..... 7,462.23

Number of fires on property insured in the factory mutuals and protected by automatic sprinklers, 185.

Saving, at \$7,462.23 per fire ..... \$1,007,401.05

Number of fires on property not insured in the factory mutuals and protected by automatic sprinklers, 90.

Saving, at \$7,462.23 per fire ..... 447,333.80

Estimate of total saving ..... \$1,455,134.85

This method of computation is against the work of automatic sprinklers, because they were at first limited to the protection of the more hazardous portions and processes of mills, and it is quite recently that they have been placed over the whole of property, including those portions generally considered as being less liable to destruction by fire; and this estimate of \$1,000,000 as the measure of the saving caused by automatic sprinklers is clearly an understatement of the true amount.

The efficiency of the present method of protection is shown by the results of the business of the Factory Mutual Insurance companies for the year ending May 1, 1885: Policies, \$392,934,693; premiums, \$3,480,157.63; losses, \$571,741.82, the fire losses being 44.58 cents on \$100, and the cost of administration about 2 cents more, making the total cost of insurance about 1/6 of 1 per cent. The fire tax, including the cost of sustaining insurance companies and fire departments, has now reached in this country \$16,000,000, which is the heaviest single tax, forming a burden grievous to be borne, not merely from its large amount, but because the greater portion of it is not accompanied by any redistribution. In the light of the logic of numbers contained in the records presented, how can the conclusion be doubted as to the most efficient method of protecting the large portion of the wealth and prosperity represented by the industrial establishments of this country?

New London, Connecticut, as a Manufacturing Site.

The citizens of New London, Conn., are directing the attention of manufacturers who are in search of desirable sites for their works to the unusual advantages which that city affords. They have been successful in attracting the attention of several manufacturing concerns, and these upon investigation have found the facilities so excellent that they have decided upon that city as their future location. Among the removals which have recently been made may be mentioned the Hopson & Chapin Mfg. Co., who have just got into fair running order after removing their works from Weathersfield, Conn. New London was famous many years ago on account of its whale-fishery industry. Some of the most notable whale fleets ever equipped sailed from that port, and in time the citizens grew wealthy from this source. With the discovery of petroleum, however, the whaling industry began to wane, and to a certain extent the prosperity of New London departed with it. It was no longer specially prominent among the active towns of the general vicinity of which it was a part, although there was abundant wealth left among its citizens. The whaling industry, being so unlike the modern manufacturing enterprise which characterizes many Connecticut towns, may account in some measure for the backwardness of her citizens in engaging in manufacturing or in attempting to promote the establishment of new industries. It is even charged by some that there was a sentiment among the older inhabitants against manufacturing enterprises, and that they were frowned upon rather than encouraged. Whatever may have been the reason, it is undoubtedly true that New London is far behind all the other cities of similar rank in Connecticut and the other Eastern States in the way of manufactures. Notwithstanding this the town possesses unusual advantages in respect of locations for manufacturing purposes.

New London has one of the finest harbors on the Atlantic coast—so fine, indeed, that many years since the Government located a navy yard some 2 miles above the city, on the Thames River, the mouth of which affords excellent anchorage. According to the statements of prominent naval authorities New London harbor offers one of the best rendezvous for fleets on our entire Atlantic seaboard. It has also been commended to the Secretary of the Navy as a desirable place for cruisers and other craft to remain when not in active service. Along the banks of the river, and around several “coves” of good size which form parts of the bay, there are excellent manufacturing sites. Many places can be selected with deep water on the one side, insuring water freights on materials and on manufactured goods, and railroads on the other side. We understand that, although several manufacturing concerns have recently located in New London, there is as yet no speculation in property, and that desirable sites are available at reasonable figures. The old element in New London, which, as we have before said, was supposed to be inimical to manufacturing industries, has given place to younger men who are progressive, public-spirited, and with intelligent in their enterprise. A board of trade has been organized, and every facility is offered to concerns seeking locations to find what they desire. With reference to the relative economy of manufacturing in a town situated like New London, and in which both water and rail freights are available, as compared with manufacturing at an inland point—as, for example, Hartford—it may be mentioned that one concern which has recently located in New London estimates the saving in freight as compared with the vicinity of Hartford equal to a little more than \$1 per

gross ton on all materials purchased and all goods shipped. In these days, when manufacturers' profits are reduced to a minimum, a saving of a dollar a ton on freight is an item well worth considering.

Efficient Machinery vs. Cheap Machinery.

Whenever machinery is to be bought for any purpose whatever there is the choice between what may be characterized as efficient machinery and that which is correctly designated by the term cheap machinery. Since all business is conducted primarily for the purpose of making money, and since a dollar saved is likened unto two dollars earned, the temptation to purchase cheap machinery rather than the more expensive and likewise efficient machinery that may be had is constantly before the manufacturer. It often requires a long head, so to speak, to see the greater economy in a machine costing \$1000 over something else that might answer the purpose costing perhaps only \$250. Problems of this kind are constantly presented and must be decided day by day, and the choice made determines in a great measure the success of the enterprise in which the machinery is used, or at least fixes the plane upon which the business is to be conducted.

In the manufacture of architectural sheet-metal work, about the only appliances available in the past have been of the class we have designated as cheap, but at present there is the same choice in this line of trade that there is in others. At the outset the tools and machines for making cornice-work were exclusively home-made. They were very naturally of the crudest description and required frequent repairs, while the labor necessary to operate them was excessive. In the course of time, however, cornice machinery came to be built by regular machine builders, and a great step in advance was made. Better machines were then available, and the labor of operating them was less than with the old home-made appliances. At that time cornice-makers had the choice between home-made machines and machines built in shops specially devoted to their production. In the progress of time home-made machines disappeared entirely and factories for the production of cornice machines multiplied, and for a time the choice lay between machines of several different makers, all being upon about the same level or of the same grade. Gradually, however, still further advance has been made, and the list of available tools for use in the business has been greatly increased until at present the choice is not between a number of articles of about the same quality, but rather between cheap machines and efficient machines—between temporary makeshifts and well-designed, thoroughly constructed machines. The cornice manufacturer now is called upon to choose between a mallet in the hands of a workman for smoothing the burr on the edges of cutwork, and a machine driving a mallet at the rate of several hundred blows a minute. He likewise has the choice between a prick punch and mallet in the hands of a workman, for marking the lines of bends in his moldings, and a machine that will prick thousands of sheets, if need be, exactly alike and with mathematical accuracy, in a tenth of the time it can be done in the old way. In squaring shears there is the choice between a poorly-built foot treadle affair for trimming sheets and a well-designed machine running by power, and capable of cutting anything, from the lightest stock up to No. 12 gauge, efficiently, accurately and with a minimum of labor. We might enumerate still other examples when there is the choice between cheap machines, which, though costing less at the outset, required a large amount of expensive labor day by day to operate them, and expensive tools, which are so efficient as to save the annual interest on their cost every week they are used.

As between a tool costing, for example, \$50 and another \$150, supposing the two are equally efficient and serviceable, there can be no argument. The cheaper tool is to be preferred. But if the more expensive tool will do a larger amount of work with the same labor to operate it, or will outwear three of the cheaper tools, then the difference in first cost is fully overcome, and the better machine is to be preferred. This, we take it, is a fair illustration of the principle that is to be observed in selecting tools and machines for use in the cornice business at the present time. Too many shops are in existence equipped with cheap appliances to make the trade profitable for any of them. While all are on the same plane there is but little opportunity for the success of any; but a change in equipment would seem to promise important advantages to those who are enterprising enough to improve the opportunity.—*The Metal Worker.*

**The Projected Bourdais Tower at Paris.**—Mr. J. Bourdais has presented to the Society of Civil Engineers a project that concerns the erection of a masonry tower 98.4 feet in height. After an examination of the different geometric profiles realizable, Mr. Bourdais has adopted the column as being more apt than any other form to satisfy the rules of aesthetics, and also as being the most stable. In fact, the highest chimney in the world—that of Saint Rollox, near Glasgow, 433 feet in height—has been submitted to numerous storms without suffering therefrom, and, as other chimneys exposed to great wind pressure have never given rise to any accident, it results that a cylindrical form is one that should be adopted. In short, Mr. Bourdais' structure would consist of a base 210 feet high, in which would be established a permanent museum of electricity. Above this would rise a six-story column surmounted by a roof, forming a promenade and capable of accommodating 2000 persons. The central granite core, 60 feet in diameter, would be surrounded with an ornamental framework of iron faced with copper. This would be divided into six stories, each containing 16 rooms, 16 feet in height and 50 feet square, designed for arboristic treatments.

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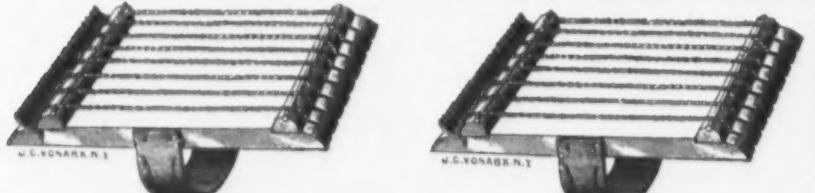
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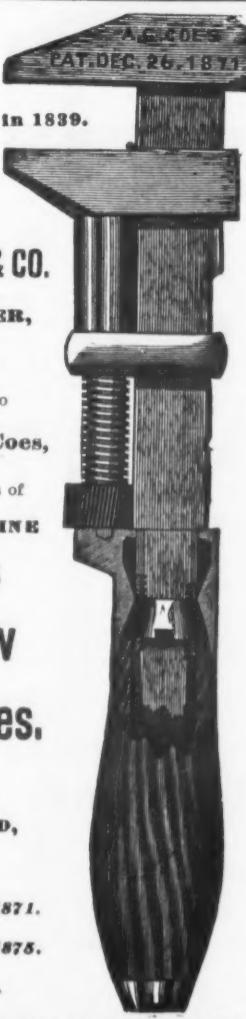
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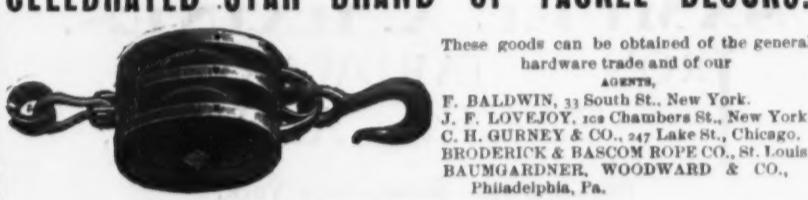
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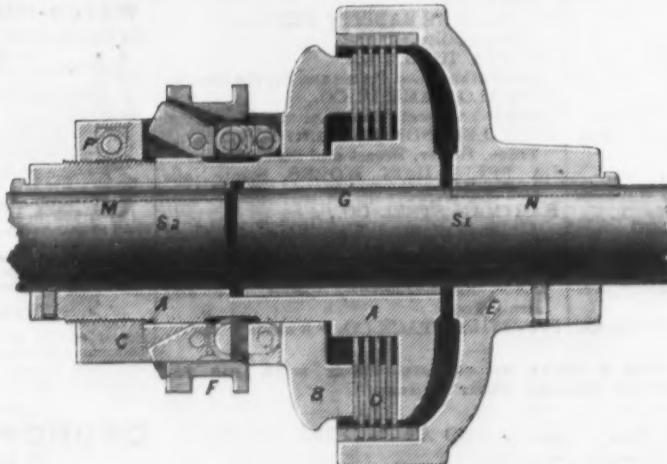
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## METALLURGICAL NOTES.

## A New Water-Jacket Furnace.

We have watched, at first with interest and then with amazement, the progress of a remarkable invention—through the columns of a large number of our contemporaries. We allude to the description of a wonderful water-jacket blast furnace, for which the world is indebted to Mr. C. L. Hartsfeld, of Newport, Ky. This marvel of a furnace is adapted for smelting iron, copper, iridium, platinum, jasper, galena, silver, gold, nickel, zinc, tin, manganese, bismuth, chrome and other ores. How zinc is to be smelted in a water-jacket is not explained, nor is it easy to understand what good there can be in putting jasper through such a fiery ordeal. We are told that "the novelty consists chiefly in the cooling of the smelting furnace by water, without using an air-tight water space. The inner cylinder can expand and contract without any resistance to temperature; the consequence is that repairs are hardly ever required. The smelting process can therefore be kept up continuously without interruption; the upper part of the furnace never gets hot, and the coke or wood does not begin to burn until it arrives at the lower part, where the smelting process takes place at once by a very strong blast. The extraction of the precious metals in this furnace is accomplished by gravitation, the heavier taking the lead, and each coming forth from the tap-hole of the lower reverberatory in the order of its weight and worth. There is consequently no dealing with bullion alloys, and if an ore will yield anything over 4 ounces of silver to the ton the furnace is so inexpensive as to remunerate the miner. As it is generally the custom in Western mining to reject all ores that do not show over 15 ounces to the ton, it will be seen that there is by this device a large margin for profit even on what are called poor ores."

To the average American metallurgist this is simply incomprehensible nonsense, but it is straining a point too far when the following is added: "As an illustration of its perfect working may be given an abstract from a report published by *Das Vogische Volksblatt* on the cost of reducing ores to metal, 96 per cent, of mineral actually converted into metal out of every 100 taken from Hartsgebirge at Clausenthal, Schlesia, argentiferous silver ores. The analysis as made by the eminent practical chemist, Mr. David Stuart, in his report for the Austro-Hungarian Government, at Vienna, is as follows:

|                                |       |                |       |
|--------------------------------|-------|----------------|-------|
| Clausenthal Mine Shaft No. 24. |       |                |       |
| Nickel                         | 2.06  | Galena         | 39.51 |
| Silica                         | 15.21 | Blende         | 8.1   |
| Alumina                        | 3.21  | Silver         | 4.2   |
| Manganese                      | 4.45  | Gold           | .1    |
| Copper                         | 7.06  | Water and loss | 1.35  |
| Sulphur                        | 12.14 |                |       |
| Lime                           | .74   | Total          | 100   |
| Potash                         | 1.87  |                |       |

The cost of reducing ore by the new water-jacketed furnace built by Mr. Hartsfeld, formerly in Colorado and other mining districts in the United States, in a No. 4 furnace of 50 tons capacity, every 24 hours, was as follows:

|  |       |       |                |       |
|--|-------|-------|----------------|-------|
| Pine wood, 10 cords at 9 marks a cord, 90  | marks | 2.06  | Galena         | 39.51 |
| Ten laborers, at 3 marks a day, 30 marks.  |       | 15.21 | Blende         | 8.1   |
| Two engineers, at 6 marks a day, 36 marks. |       | 3.21  | Silver         | 4.2   |
| Four teams, at 8 marks a day, 32 marks     |       | 7.06  | Gold           | .1    |
| 800 daily, 38 marks                        |       | 12.14 | Water and loss | 1.35  |

Total cost per 24 hours, 208 marks 80 pfennig. \$51.00

The value of the ore per ton is \$72. The daily capacity, 50 tons, \$3600. Deduct cost of smelting, \$51, leaving a daily net profit of \$3549, or 14,196 marks.

While it is true that much is claimed to be "silver ore" is not argentiferous, a few instances of rascality do not warrant the adoption of such a double-barreled term as "argentiferous silver ore."

There is a place called Clausthal in the Hartz Mountains, but it is not within hundreds of miles of "Silesia," nor is there a Shaft No. 24 anywhere in that district, nor has there been a single ton of ore extracted from the mines of the Clausthal district during the past 20 years containing 4.2 per cent. of silver. We do not know who Mr. David Steuart is, but, if he ever put his signature to an alleged analysis like that quoted above, his reputation as a chemist is forever wrecked.

In conclusion, we may state that if Mr. Hartsfeld has ever worked in Colorado or elsewhere for any length of time he should know that our Western mines are not paid "pauper-labor" wages of the effete mining districts of Europe. The lowest cost of smelting at one of the best located, most modern plants of the West is \$5.60 per ton, and it does not take Mr. Hartsfeld to discover that \$72 is about as profitable a basis for working as can be found in the West in daily quantities of 50 tons. We sympathize with our contemporaries.

## The Marchese Electrolytic Process.

The copper trade in all parts of the world is deeply interested in the improvements made in rapid succession in the electrolytic process, which has now been introduced, in one or another form, into Germany, France, England, Italy and the United States. Among the latest referred to in metallurgical literature is that of Eugenio Marchese, of Genoa, Italy, introduced by him two years since at the copper mines of Casarza, near Genoa, and adopted after a trial by the progressive Stolberg Company, of Germany. In its principal features it consists in smelting a part of the copper ores into a matte containing about 30 per cent. of copper, 30 per cent. of sulphur and 40 per cent. of iron. This matte is cast into thin plates which are used as the anodes, while copper sheets are the cathodes. Another part of the ore is roasted and leached, a little sulphuric acid being added to dissolve copper oxides. This solution constitutes the bath in the electrolytic vats. The sulphate of copper in solution is decomposed and is deposited on the cathodes, while the anodes are attacked. The iron salts and the sulphuric acid formed prevent the precipitation of the iron or the disengagement of hydrogen, while the copper deposits firmly as pure metal at the cathodes. The copper in the solution escaping from the vats is precipitated by sulphurated hydrogen, the precipitate being added in the first smelting process. The greater part of the electromotive force required for the de-

composition of the sulphate of copper is furnished by the oxidation of the iron in the anodes, so that the potential required for each bath is less than 1 volt. The residue of the anodes, consisting chiefly of sulphur, is used for the manufacture of sulphuric acid. The minimum yield per horse power per day by the Marchese process is 20 kilograms.

## Plans and Processes.

A cut steel nail with a stronger head than heretofore made has been patented by J. Young, of Wheeling, W. Va. The inventor states that the defect in the heads of the nails heretofore made resulted principally from the fact that the header would abruptly disarrange the fibers in the head. To remedy this defect the dies which hold the blank are provided at the top with a tapering groove. When the header comes down it crowds the metal into the groove to form a concave swelling neck. The fibers of this neck are parallel, more or less, with those of the body, so that no sharp angle of weakness is said to be left. Furthermore, the body of the nail is not grasped by the dies for about  $\frac{1}{4}$  inch from the head, and therefore the hot metal is not crystallized before being headed by the contact of the dies close up to the head.

H. Schulze-Berge, of Rochester, Pa., has patented means for preventing the clogging of the tuyeres in a fixed converter. The tuyeres are formed of removable blocks of refractory material, each inclosed at the outer end by an air chamber to which a blast-pipe is connected. The blocks surround a metallic blast tube, which at its upper end is fastened to the metal barrel of a stop-cock or valve. This valve has a stem which extends across the air chamber, and which contains a port that connects the tuyere with the air chamber. The valve stem is attached to a hand lever. The lower end of the tuyere is provided with an enlarged mouth of equal or greater cubical capacity above its lower end than that of the tube above the mouth. This mouth acts as a trap to inclose air when the converter is filled with metal above the tuyeres, so that even when the valve is closed the molten metal can rise only far enough to compress the entrapped air sufficiently to establish an equilibrium between it and the weight of the column of molten metal in the converter.

The Trenton Iron Company, of Trenton, N. J., are the assignees of the patent right in a new metallic fabric to be used for fencing, bed bottoms, screens and for similar objects. The uprights of this fabric are composed of corrugated or wave-like rods of elliptical form in cross-section. The horizontal binding cables are each composed of two wires twisted together. The wires are twisted for a short distance, and are then spread apart for the introduction of an upright, after which they are again twisted until the place for the next upright is reached. The office of the corrugations in the uprights is to form seats for the wires, while they serve at the same time to impart a good appearance to the completed fabric.

W. Huston, of Wilmington, Del., has patented a perforated tile for furnace linings to be used for subdividing the products of combustion, or the incoming fresh air. These tiles have heretofore generally been made of the ordinary fire-clay, which was apt to become vitrified and would then clog up the holes. The new tile is made of glassmaker's clay, a composition used by glassmakers in the manufacture of their melting pots. This composition consists mainly of German clay mixed with old pulverized melting pots and with coarse sand. The inventor states that he has made perforated slabs from this material  $\frac{2}{3}$  inches thick, with holes of  $\frac{1}{8}$  inch in diameter and a little over an inch from center to center, and that these slabs have resisted intense heat without any such fluxing as to obstruct the perforations.

A mold for casting steel, which is provided with an attachment for condensing the latter by gaseous pressure, has been patented by J. Henderson, of Bellefonte, Pa. The cover and base are connected to the body of the mold in such a way that they will not be separated under severe internal pressure. The connection is formed by lugs attached to the several parts, and joined by means of keys and wedges driven through or between the same. To the under side of the cover there is attached an inverted shallow cup made of thin sheet metal drawn to the required shape in a die. This cup is made to contain a pasteboard chamber, which receives a charge of powder. The bottom of the chamber is forced out by pressing upon a plunger which projects upward, through the cover. This plunger also displaces the bottom of the sheet-metal cup. The charge falling upon the hot metal beneath burns and generates gases of high pressure, which compress the metal.

A tool for turning very small pinions heretofore made by hand has been patented by E. Horton, of New Haven, Conn. It consists of a wide flat bar adapted to be secured in the toolstock of a lathe, so as to be moved in like manner as a common turning tool.

On the upper or working surface of the bar several grooves are made diagonally across it, which leave diagonal ribs between them. The forward edge of each rib is undercut to produce a cutting edge at the upper forward angle of the rib. The height of these ribs gradually increases from the forward edge rearward, while the upper surfaces of all the ribs are parallel to the surface of the bar. Across the surface of each rib recesses are made at right angles to the path of movement, which correspond to the work to be performed. The work is operated upon by the several ribs in succession.

C. Wittenstrom, of Stockholm, Sweden, has patented a casting apparatus for making a number of small castings when the iron is soft or low in carbon. In this case the metal must be prevented from solidifying in the ladle and also from oxidizing. To this effect the ladle or its lid is provided with a large gas burner or other suitable heating device. The flame is made to issue out from the lip or mouth of the ladle, so as to surround the jet of metal. In order to pour the metal in a steady, even jet the tipping axis of the ladle is made to coincide with the edge of the lip, and thus the tipping of the ladle does not change the position or direction of the jet. The molds are grouped on a turn-table, and may be quickly brought successively under the jet, or the ladle may be swung on a crane if preferred.

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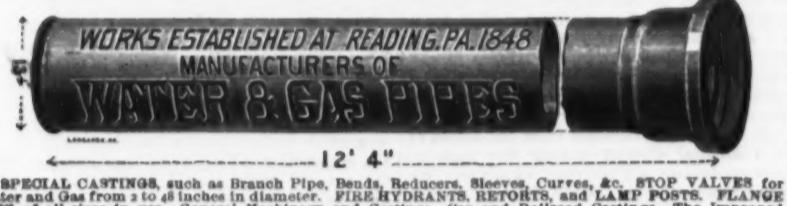
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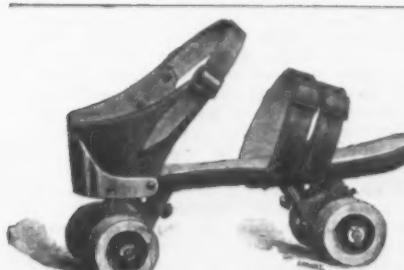
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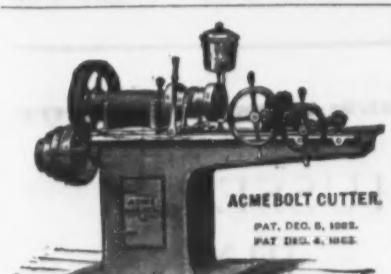
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## English Letter.

(From Our Regular Correspondent.)

LONDON, June 1, 1885.

## THE ADVENT OF JUNE

does not find us much, if any, better off than we were at the beginning of January—indeed, it is quite open to question whether we have not gradually retrograded in the meantime. In some quarters there is a distinct and decided impression that we have gone back all along the line, while in others the opinion expressed is that we have been gradually weeding out our weaknesses and so preparing ourselves for that good time which is bound to come along sooner or later. Which of these views is the correct one I do not profess to be able to state, but I would remark that, so far as values afford any reliable indication of the course of events, we are by no means ahead of six months ago. Without attempting to go into exhaustive details it is an admitted fact that almost all crucial prices have been steadily forced down for months past, so that on that head the evidence is crushing and beyond dispute. We have also the testimony afforded by the reserve stocks of pig iron, so far as our statistics in that direction can be depended upon. In Scotland, at Middlesboro' and on the West Coast of Cumberland the reserves have been augmented concurrently with the depression of values, while the shipping returns and other statistics all point to the same conclusion, which is, broadly, that the demand has been of insufficient volume to keep pace with the production, even with the advantage of some of the lowest values ever recorded. It is thus pretty clear, in my opinion, that we shall have some time to wait before we again feel that we are on the high road to even moderate prosperity, not to say anything of a real rush or "boom." Many gaps are yet to be filled up, large stocks must be reduced, values must be equalized and firmed up, and, above all, public confidence in the stability of things must be restored, before our iron and steel trades will march onward. The decline in values as well as in the production of one of our largest districts are plainly demonstrated by the following return of Mr. Waterhouse, the sworn accountant of the Northern Board of Arbitration and Conciliation:

Having collected from the firms and companies belonging to, or associated with this purpose with, your board, the returns of their sales of manufactured iron during the two months ending April 30 last, and having verified the same by an examination of their books, I certify the average net selling price per ton to have been £4. 17/11. Beneath is a statement of the different classes of iron sold, and the average net selling price of each:

SALES DURING THE TWO MONTHS ENDING

APRIL 30, 1885.

| Description. | Weight invoiced. | Percentage of total. | Average net selling price £ per ton. |            |
|--------------|------------------|----------------------|--------------------------------------|------------|
|              |                  |                      | ton.                                 | s. d.      |
| Rails...     | 498 10           | 2.15                 | 76                                   | 4 14 10.92 |
| Plates...    | 38,398           | 8 3 20               | 58.77                                | 4 17 5.51  |
| Bars...      | 14,575           | 11 1 25              | 22.33                                | 5 3 10.11  |
| Angles...    | 11,840           | 19 1 25              | 18.14                                | 4 12 3.88  |
| Total.       | 65,283           | 10 1 17              | 100                                  | 4 17 11.12 |

The following are the figures for the previous two months:

| Description. | Weight invoiced. | Percentage of total. | Average net selling price £ per ton. |            |
|--------------|------------------|----------------------|--------------------------------------|------------|
|              |                  |                      | ton.                                 | s. d.      |
| Rails...     | 709 15           | 0 15                 | 1.14                                 | 4 14 2.7   |
| Plates...    | 36,398           | 19 2 16              | 58.23                                | 4 18 4.36  |
| Bars...      | 19,730           | 19 0 28              | 21.97                                | 5 6 4.24   |
| Angles...    | 11,859           | 19 1 9               | 18.66                                | 4 12 3.45  |
| Total.       | 62,460           | 18 1 7               | 100                                  | 4 18 11.18 |

Whether any lasting or considerable effect is likely to be produced by your strike we are yet in no position to forecast. Telegrams state that the strike is pretty general, with certain exceptions, and that it is likely to last all summer. Were that a certainty we might perhaps look for some augmentation of the American demand for British iron and steel, but those among us who have had experience on former similar occasions are too well aware that your manufacturers would not be likely to do anything which would afford undue encouragement to our producers. In any case, however, the dispute will be watched with a good deal of interest on this side, especially as the action of the employers seems to indicate a fixed intention to break-up, or at least to weaken, the power and dominance of the Amalgamated Association.

The Whitsuntide holidays have been very largely and generously observed this year, and, as I predicted, the employers have been only too glad to stop their mills and forges. In numerous cases the stoppage was prolonged for the entire week, and in a few instances several days will elapse, even now, before a fresh start is made. Under these conditions it is not surprising that there is very little indeed that is new to record in connection with the iron trade or its near allies. The current facts and prices I deal with in another paragraph, but I am bound to state that my task as your English "recording angel" is

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for Every  
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Economical  
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**GUARANTEED TO GIVE**  
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PATENTED  
April 3, 1883.

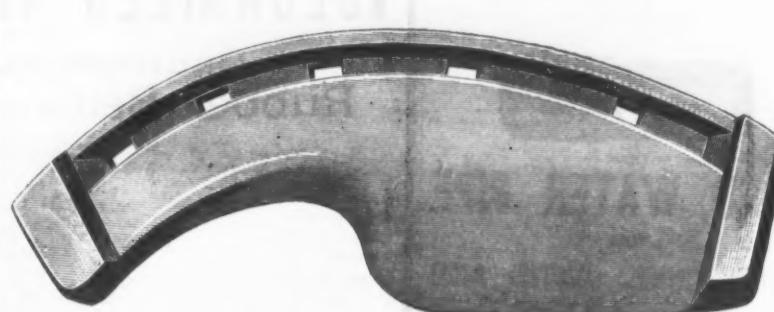
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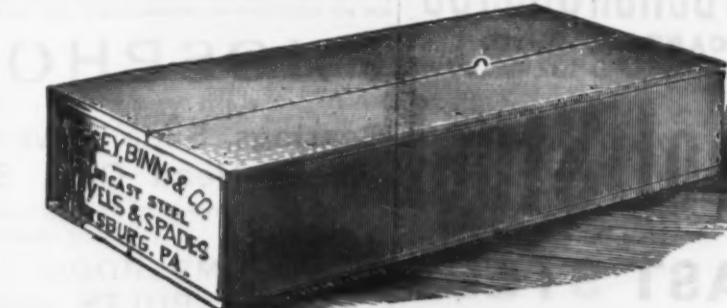
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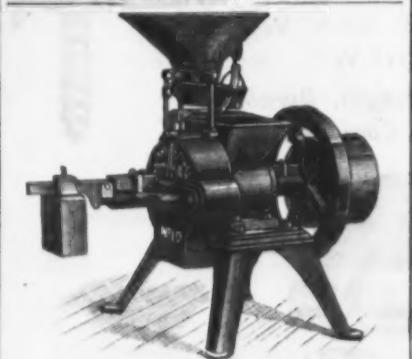
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some few for coke and charcoal tin plates, and, as usual, the second steels (Bessemers) have come in for their usual good share of attention, with Siemens steels in coke grades following closely on those. There are not, perhaps, so many inquiries for cokes and charcoals as there were last week, though the slight improvement in prices was in cokes and Bessemers, the orders for which were fixed up this week. Where 13/16 IC was the utmost offered previously for some ordinary and good coke tins, 13 1/2 @ 13/3 IC has since been freely given, and in the case of Bessemers 13/6 @ 13/9 have been paid where only previously these figures were difficult to secure and could not be obtained for some brands. Leading brands of coke tins are still 13/6 @ 14/16 IC. Wasters are without much change in prices, though the demand for these seems a bit quiet; 12/3 @ 12/9 is about the general quotation, but 12/6 is mostly paid. The prices offered for charcoal tin plates are, as usual, low, viz., 13 1/2 @ 17/6 IC. Though the orders for ternes have come in pretty regularly lately, prices are difficult to move in an upward direction. In fact, buyers will not pay much, if any, advance. This is explained by the fact that with the very low prices that have been ruling for tin plates makers turned their attention more to ternes plates, for which fair prices were paid them. But now these have been overdone again, and, like tin plates, do not command better figures, even during the best season.

Underwood brought suit to restrain them. They denied as positively as he had affirmed that they had infringed on his rights, and claimed his own patent was invalid for lack of novelty. It was on the lack of novelty of the invention that the suit was decided, though this was made a subordinate matter in the decision.

### Preserving Processes for Timber.

Mr. John Bogart, secretary of the American Society of Civil Engineers, has, for the convenience of members who desire to discuss the report of a special committee on the preservation of timber, at the coming annual convention, printed the following brief summary of its contents: The experience in the United States is given in five tables, comprising the results more or less conclusive of 142 authenticated trials or experiments. In each case these are referred to at more or less length in the text, sufficiently to give the reasons for success or failure, and the lesson taught. The five heads corresponding to the tables are: 1. Kyanizing, or use of corrosive sublimate. 2. Burnetizing, or use of chloride of zinc. 3. Creosoting, or use of creosote oil. 4. Boucherie, or use of sulphate of copper. 5. Miscellaneous, or use of various substances. Of the first, kyanizing, it is stated that an absorption of 4 or 5 pounds of corrosive sublimate per 1000 feet, b. m., is considered sufficient, and it would now cost about \$6 per 1000 feet, b. m. It is not recommended except in situations where the air can circulate freely about the wood, as in bridges and trestles, but in very damp locations (as for ties when in wet soil and pavements) its success is doubtful. Its cost when first used led to cheating, which for a time brought discredit upon it. Burnetizing the committee do not consider the best adapted to use where the timber is exposed to the washing action of water (as this removes the preservative); but, on account of its cheapness, it is probably to be preferred at the present time to any other process for the preservation of railroad ties. The Well house, Thilmany and other modifications of the process aim at making the chloride insoluble, but are yet on trial. This process has been largely and successfully introduced in Germany. Experience shows the life of soft wood ties to be doubled and trebled by its use. Its cost in this country is about \$5 per 1000 feet, b. m., or 20 to 25 cents per tie, and for the latter purpose the committee particularly recommend it.

The work must be well done; but some of the failures were from doing it too well—that is, from using solutions of too great strength, thus making the timber brittle. A solution of 2 per cent. by weight of chloride of zinc in water is recommended. Creosoting, or the injection of timber with hot creosote oil in a cylinder under pressure, is considered to be the very best process which has been fully tested where expense is not considered. It is as yet the only one known which is sure to prevent the destructive attacks of the teredo or other marine animals, and to give absolute protection against decay in very wet situations. It is a somewhat expensive process, requiring for protection against the teredo from 10 to 20 pounds per cubic foot of timber, and costing from \$12 to \$20 per 1000 feet, b. m. For resisting decay alone a cost of \$10 to \$14 is sufficient. The boucherie process, in which green timber is impregnated with sulphate of copper either by vital suction, hydraulic pressure or a vacuum, when well done, using a solution of 1 pound of sulphate to 100 of water, has proved fairly successful. Under the head of "miscellaneous" are classed 41 experiments with almost as many substances—sulphate and pyrolygite of iron, lime, resin, oil, tar, &c.—but with as yet no commercial success. The general principles laid down are to select the process with reference to the subsequent exposure. Use open-grained porous timber—for that reason, in general the cheaper woods. Extract the sap and water to make room for the material to be injected, natural seasoning, except for the boucherie process, being very desirable. Steaming takes the place of seasoning. Use enough of the antiseptic to insure a good result, and then let the timber dry before using, as its durability will thus be increased. Do not hasten the work if it is to be well done. Protect ties or timber in the track as far as may be from water by drainage. Contract only with reliable parties of established reputation, under a skilled inspector, who must be in constant attendance when the magnitude of the order warrants. There is at the close a discussion of the question, Will any preserving process pay? This is answered in the affirmative. The chairman of the committee gives a careful estimate in one of the appendices in an actual case in this country; another general estimate is given based on European experience, and three other separate appendices give different methods of examining the question of economy and comparing values. Other appendices (to the number of 20 in all) treat of the general question of destruction and conservation of forests, and give reports of the personal experience of a number of engineers, with methods pursued, apparatus used, &c.

S. A. Ginna, of Plainfield, N. J., and R. A. Donaldson, of Brooklyn, N. Y., are the patentees of a machine for printing metal plates and for fixing durable colored impressions on such plates. The frame of the machine carries a table to which a reciprocating motion is given. On the table is fixed a lithographic stone, which, by the motion of the table, is carried beneath the inking rollers, and also beneath an impression or printing cylinder. To the periphery of this cylinder a sheet of thin cardboard, well-sized and highly glazed, is attached, which receives the impression from the lithographic stone. Over the printing cylinder is a second or pressure cylinder, and the tin plates or other metal plates to be printed are passed between the two cylinders. Several colors may be printed, either by different machines or with the same machine, in which case the stone, inking arrangement and cardboard are first changed. After the plates are printed they are stoved and varnished or polished in the usual manner.

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The specimen page here shown is from the last division of the book, entitled "Pattern Problems," and which embraces more than one-half of the entire work. It shows the manner in which practical questions are treated. The list of problems demonstrated is very extensive, and embraces almost everything of common occurrence in the sheet-metal trades, with enough of the exceptional to show methods adapted to special requirements. This chapter, in short, is a ready reference book for all who have pattern cutting to do. Each demonstration is complete in itself. A carefully prepared index facilitates reference. The work has been prepared for sheet-metal workers in general, and not for any one class in particular. The tinner will find in it what he requires, without the necessity of studying the cornice problems. The cornice maker will find in it everything, from a simple miter to the most complex problems, so arranged as to meet his requirements without the necessity of going through portions in which he is not interested. The general student will find the entire subject presented in such a manner as will facilitate systematic study. The rapidity with which each edition has been exhausted, and the universally favorable

*Pattern Problems.*

161

**G H K**, of Fig. 426, is presented one of the sets of conditions which necessitate a change of profile, in either the horizontal or raking molding, in order to accomplish a miter joint at the point indicated by **I H** in the plan. In other words, the conditions are such that with a given profile, as shown by **A'** in the raking molding, the horizontal molding forming the return will require to be modified, as shown by the profile **A''**, in order to form a miter upon the line **I H** in the plan; or, if **A''** is established, **A'** will have to be constructed to correspond with **A''**. The reason for this is quite obvious. The distance across the raking molding at right angles to its lines is greater than the corresponding distance across the return molding at right angles to its lines; therefore the projection in the cornice, as shown by the profile **A''**, must be distributed through a smaller space than is shown in the profile **A'**. In this problem we assume that the pitch of the raking cornice **B C** is established and that the profile **A** is given, and from these parts it is required to develop the modified profile. We have the choice of placing the normal profile in the horizontal return and making the raking profile correspond with it, or of placing the normal profile in the raking molding and making the profile of the horizontal molding agree with it. Although the principle upon which these operations is performed is identical in both, the demonstration will be made clearer if each is fully illustrated independent of the other. In this problem and the following one, therefore, we show the several steps necessary to take in modifying the profile, and in cutting the several patterns required to form the structure indicated by the elevation and plan. First we will assume that the normal profile occurs in the raking cornice, and that the horizontal profile is to be modified to suit it. We then proceed as follows: Draw a representation of the normal profile in the raking cornice, as shown by **A'**, placing it to correspond to the lines of the cornice, as shown. Draw another profile corresponding to it in all parts, directly above or below the foot of the raking cornice, in line with the face of the new profile to be constructed, placing this profile **A** so that it shall correspond with the lines of the horizontal cornice. Divide the profiles **A** and **A'** into the same number of parts, and through the points thus obtained draw lines, those from **A'** being parallel to the lines of the raking cornice, and those from **A** intersecting them vertically. Through these points of intersection trace a line, which gives the modified profile, as shown by **A''**. Then **A''** is the profile of the horizontal return, indicated by **G H I F** in the plan. It is also the elevation of the miter line **I H** of the plan for the several patterns involved. We therefore proceed as follows: At any convenient point at right angles to the lines of the raking cornice lay off the stretchout **M N** of the profile **A'**, through the points in which draw measuring lines in the usual manner. Place the T-square at right angles to the lines of the raking cornice, and

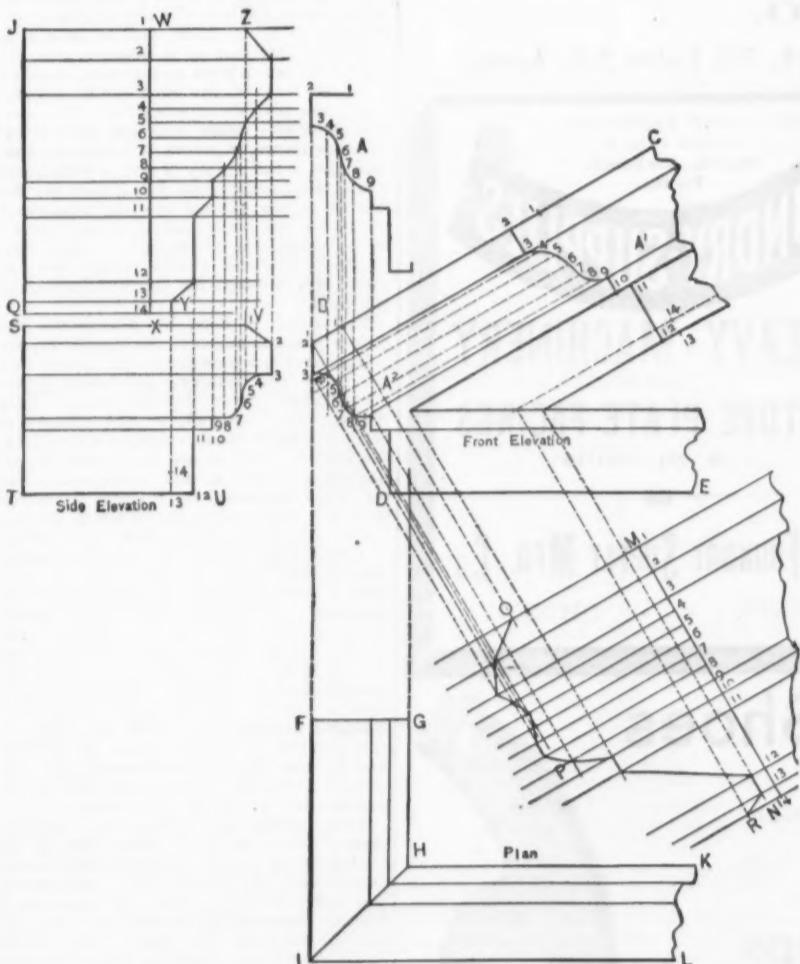


Fig. 426.—To Ascertain the Profile of a Horizontal Molding Adapted to Miter with a Given Inclined Molding at Right Angles in Plan, and the Several Miter Patterns Involved.

comments it has called forth, prove that it fully meets the want it was intended to supply.

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(Concluded from page 1.)

kept under constant pressure of 450 pounds per square inch. Attached to these rams are two wrought-iron bars  $2\frac{1}{2}$  inches square. These go through the bed-plate and roll standards to the under side of the top roll carriage. The roll is moved by hydraulic pressure by means of a cylinder 9 inches in diameter by 24-inch stroke placed horizontally on the top of one standard, as shown in Figs. 1 and 4. This works two screws 10 inches in diameter over the threads, which are 2-inch pitch. A steel pinion is keyed on each screw, and geared into them are two quadrants, one on each standard. These are connected together by a wrought-iron connecting-rod passing from standard to standard, as shown in Fig. 1. The ingot has to pass four times through each of the first and second grooves. The top roll is raised for the first pass and lowered for the second; the bar is then turned on edge, and the top roll raised for the third pass, and for the fourth the roll is again lowered. The bar passes twice through each of the four succeeding grooves, the top roll closing on the bottom in each case for the second pass. The speed varies from 18 to 24 revolutions per minute.

Fig. 8 is a general plan of the whole mill. The engines are of the horizontal type made for work of this description by Messrs. Galloway & Sons, Manchester. They are geared

bering that at least in this case they have proved inferior to those of cast iron, and seem to require protection against fire quite as much as the cheaper kind. The simplest protection, as we may again remind our younger readers, both for cast and wrought columns, consists of a coat of plaster, put on wire cloth wrapped around the columns. If the wire cloth is held out a little from the iron by wooden furrings or by corrugations in the cloth, so as to give the plaster a good key everywhere, a perfect protection is secured at a very small expense, and we should not be sorry to have the law require such protection for all columns used in building.

#### A Safeguard Against Collisions With Icebergs.

The danger to ocean steamers from collisions, during fogs, with icebergs has induced Prof. Alexander Graham Bell, the famous inventor of the telephone, to call the attention of the public, through the columns of *Science*, to the method proposed by Mr. Frank Della Torre, of Baltimore. Professor Bell speaks of the subject in the following language:

Mr. Della Torre's experiments indicate the possibility of obtaining an echo from an iceberg when in dangerous proximity to a ship. Mr. Della Torre believes that even an object offering so small a surface as a floating wreck may in this way be detected

ments on the Patapsco River a curious rumbling effect, like the rolling of thunder, was often observed, which continued for some seconds. A similar sound was also noticed, as an echo from a well-wooded shore, but the effect alluded to above could not have been due in any way to the land, as the sound commenced immediately upon the firing of the gun, whereas the shore was distant at least 1 mile or  $1\frac{1}{2}$  miles. The sound was probably due to the presence of ripples on the surface of the water, as the effect was much less marked when the surface was smooth. Such a sound might prove a disturbing element of importance in a rough sea, but would hardly be sufficient to prevent the detection of an echo from a large iceberg. Had shots been fired periodically from the bow of the City of Berlin, it can hardly be doubted that the presence of an obstacle ahead would have been discovered in time to prevent the collision that actually occurred.

#### Isochromatic Photography.

As long ago as 1873 Dr. Vogel, an eminent German photographic chemist, announced that by staining the photographic film with various dyes its sensitiveness to certain colors was decidedly increased, and, though the announcement was not directly of commercial value, it suggested a line of experimental investigation which, in his hands, and notably in the hands of another

lithograph of a lady wearing a bright scarlet hat with purple feather, a yellow-brown cape, and a dark-blue dress. Two pictures of this subject were shown side by side, one taken by the ordinary photographic method and the other by the Ives "isochromatic" process. In the first there are scarcely any visible differences in the dark shades of the hat and feather, and cape and dress; in the other these are all perfectly distinguishable by marked differences of shade, the purple feather being much darker than the scarlet hat, and the cape distinctly lighter than the dress, showing in the most convincing manner the capacity of the Ives process to bring out the full value of all the colors which photograph too dark or too light by the ordinary methods. From this advanced standpoint it will not be difficult to understand that by indirect methods photographs in colors may be obtained. When the photographer is armed with plates which are equally sensitive to all colors, especially to red and yellow, which have hitherto given the greatest trouble, he can readily, by the use of suitable color screens to cut out certain colors successively, produce from any colored object a set of three negatives, in one of which the shadows in another the yellow, and in another the red. It will only be necessary now to make from these negatives prints in transparent pigments, blue, yellow and red, and

satisfactory. An attempt to substitute sulphate of manganese for nitrate of lead in this battery did not answer the purpose, as the peroxide of manganese separated itself, not in a continuous layer, but in loose scales.

#### Petroleum for Boiler Scale.

A writer in *Cotton, Wool and Iron* says that several years ago he was engaged to take charge of a steam plant in what is known as the alkali region. The water was so impregnated with minerals that it was next to impossible to keep boilers in passable condition, and many were ruined before they had been in service two years. This plant had been in operation only three months, yet the deposit in the boiler was very heavy, so far as could be judged. All kinds of scale exterminators were used, but to no purpose. At length in desperation, while cleaning boilers, kerosene oil was taken, and the scale thoroughly saturated with it. The boilers were allowed to stand until the scale had absorbed all the oil before filling with water. After two weeks' run the boilers were emptied for cleaning. Upon taking off the hand-hole plates it was found that the bottom of the boilers was covered with detached scale. The tubes looked as though they were just recovering from an attack of small-pox, while the scale which still adhered to them could easily be removed. The heads and other spots where the deposit had not been removed were again wetted with oil. The

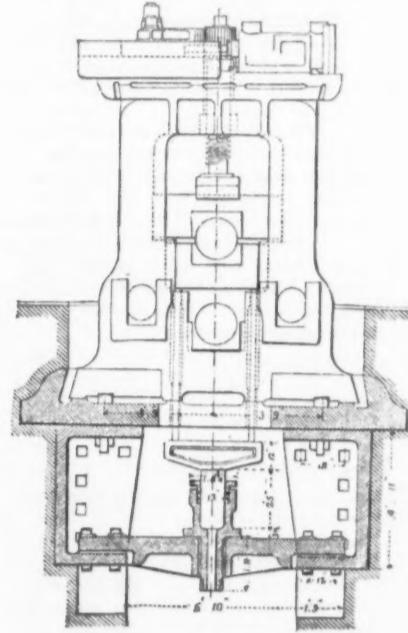


Fig. 4.—Side Elevation.

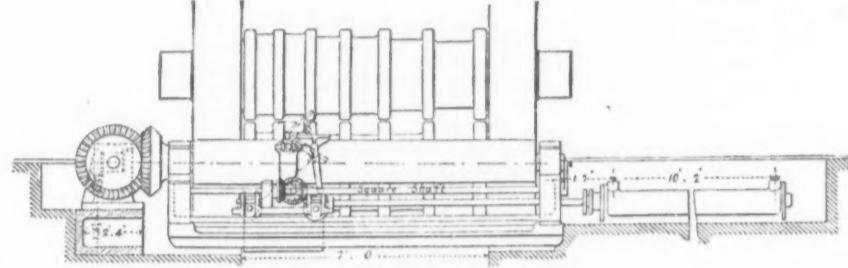


Fig. 6.—End View of Feed Tables.

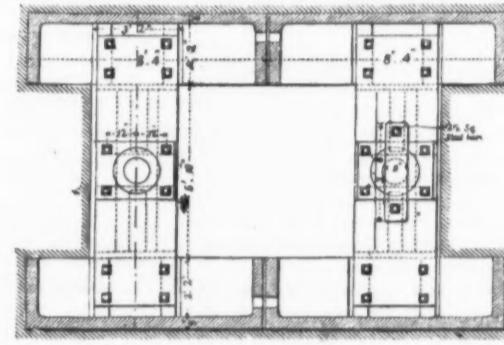


Fig. 7.—Bed-Plate of Roll Standard.

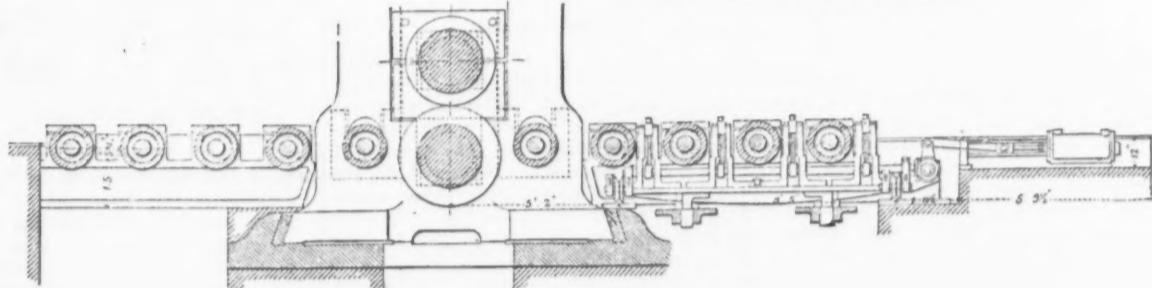


Fig. 5.—Vertical Section of Feed Tables.

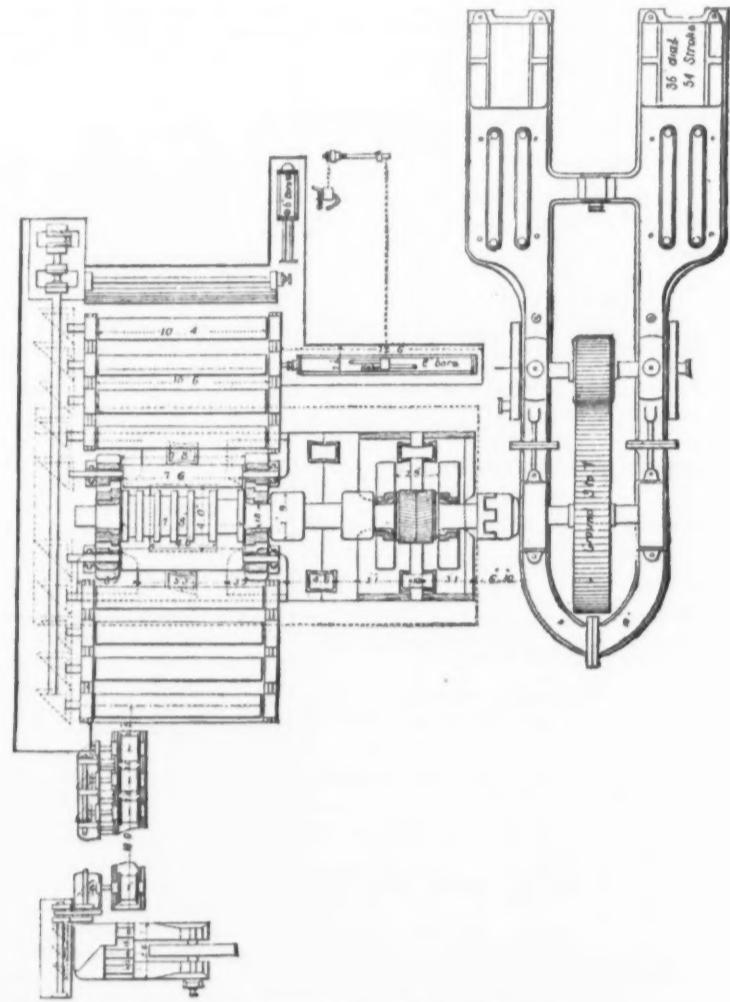


Fig. 8.—General Plan of Blooming Mill.

#### BLOOMING MILL WITH BALANCED TOP ROLL AT THE EBBW VALE STEEL WORKS.

3 to 1, and have hydraulic reversing gear with a cylinder 5 inches in diameter by  $12\frac{1}{2}$  inch stroke. The engines are connected to the rolls by means of coupling boxes, helical teeth, pinions and breaking spindles.

#### SCIENTIFIC AND TECHNICAL

##### The Resistance of Cast and Wrought Iron Columns to Fire.

Some experiments, according to the *Builder*, have recently been made in Munich, by Professor Bauschinger, to determine the comparative security of exposed cast and wrought iron columns in case of fire. It is well known to most architects that cast-iron columns are liable to warp and crack when subjected to the heat of a conflagration, particularly if cold water is thrown upon them while they are hot, and precautions against this are now very commonly employed where iron columns are used in building. In New York the law requires that all cast-iron columns which sustain walls shall have an independent exterior casing, to protect them both from the heat of a fire and from water, and a similar regulation, extended to all cast-iron columns used in building, has lately been adopted in Berlin. Columns of wrought-iron, however, which are, of course, much less brittle than those of cast-iron, are allowed to be used there without protection, and Professor Bauschinger's tests seem to have been made primarily with the intention of obtaining information as to the behavior, under the conditions which exist in a building on fire, of these columns, which, though often used by engineers for supports of bridges, are seldom employed in strictly architectural work. For the purpose of experiment, unprotected columns, both of cast and wrought iron, were loaded with the average weight which they are expected to sustain in actual buildings, and were then heated first to a temperature of  $300^{\circ}$ , then to  $600^{\circ}$ , and finally to a red heat, and were then suddenly cooled by a jet of water from a hose. Under these circumstances the cast-iron columns warped and cracked, as was expected, but did not yield entirely, while the wrought-iron columns began to bend before they were heated to redness, and were so violently distorted when cold water was thrown upon them that they could no longer support their load. No doubt the form of the wrought-iron column would determine to some extent its liability to bend when heated, but it is worth remem-

bering that at least in this case they have proved inferior to those of cast iron, and seem to require protection against fire quite as much as the cheaper kind. The simplest protection, as we may again remind our younger readers, both for cast and wrought columns, consists of a coat of plaster, put on wire cloth wrapped around the columns. If the wire cloth is held out a little from the iron by wooden furrings or by corrugations in the cloth, so as to give the plaster a good key everywhere, a perfect protection is secured at a very small expense, and we should not be sorry to have the law require such protection for all columns used in building.

At a recent meeting of the Franklin Institute Mr. Ives exhibited some remarkable specimens of his process, consisting of photographs of landscapes and of colored pictures, in which every detail of the natural shading was faithfully reproduced. One of these pictures was quite remarkable. The subject selected was a highly-colored chromo-

experimentalist about to be named, has apparently solved the problem to practical perfection. Some six years later, says the *Bulletin* of the Novelties Exhibition, Mr. Fred. E. Ives, an American photographer, taking up this interesting line of research, succeeded in finding a substance which, when the plates were treated with it, rendered them remarkably sensitive not only to all shades of red, but also to orange, yellow and green. This substance was chlorophyl, the green coloring principle of the leaves of plants. By placing in front of his lens a color screen consisting of a small tank containing a weak solution of bichromate of potassium, to cut off part of the blue and violet light, Mr. Ives obtained with his chlorophyl plates the first photographs in which all colors were reproduced in the true proportions of their brightness, as they affect the eye. Mr. Ives had undoubtedly made a valuable discovery, but he labored under the disadvantage of being comparatively unknown. When, therefore, in 1879 he published an account of his method of "isochromatic" photography, it was so great a step in advance of anything then known that his claims were regarded as too improbable to merit respectful consideration, and, as he himself says, he "could not persuade any one to give the method a fair trial." The announcement, however, by Dr. Vogel, about a year ago, that he had, after many years of persistent investigation, succeeded in discovering a successful process of this character, aroused the greatest interest in the scientific world, and accomplished the unlooked-for result of directing attention to the long-forgotten procedure of Mr. Ives, which was found to be not only a perfectly practical one, but also to give results decidedly better than it was possible to attain by that of Vogel. The result of the widespread discussion of the subject which has been going on in the columns of the photographic journals has been that the tardy justice of a full acknowledgment of his important service to photographic chemistry has been accorded to a meritorious investigator.

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to superimpose these suitably upon a white surface, to obtain a picture which will represent not only the lights and shadows of the object in their true proportions, but also the colors of the original. This has actually been accomplished, and from the widespread interest which the whole subject is now attracting throughout the photographic world it not hazarding too much to predict that we are on the eve of some interesting discoveries in this field of experimental research.

#### A New Secondary Battery.

At a recent meeting of the Berlin Physical Society Dr. Kalischer described a new secondary battery intended to overcome the disadvantage of the usual accumulators, namely, that the sheet of lead used as anode was very soon destroyed. This object he is said to have attained by adopting a very concentrated solution of nitrate of lead as electrolyte and iron as anode. The iron, on being immersed in the solution of lead, became passive and resisted every corroding effect of the fluid; in other respects the peroxide of lead on the electric charge became deposited at the anode as a very firm coherent mass, enveloping and protecting the iron on all sides. The charge was continued until the greater part of the nitrate of lead was decomposed, a condition which was marked by the occurrence of a greater development of gas at the anode. At the beginning of the charge all development of gas must be avoided, as otherwise the peroxide of lead, or, more correctly, the hydrate of peroxide of lead, became covered with bubbles. As cathode a sheet of lead was used, but it was attended by two disadvantages. In the first place the lead, during the charge, separated itself at the cathode into long crystal threads which soon passed through the fluid and produced short circuiting. In the second place the nitric acid, which remained in the fluid after the separation of the lead, acted very powerfully on the sheet of lead. Both disadvantages Dr. Kalischer avoided by amalgamating the cathode. This accumulator of iron, concentrated solution of nitrate of lead and amalgamated lead yielded, after the electric charge, which could be carried out without any special preparations, a current of about 2 volts; after about six hours' discharge, however, the electro-motive force sank to 1.7 volts, but, on the battery being left to itself for 24 hours, it increased a little. According to the measurements hitherto taken, the functions of this accumulator were

next run was of four weeks' duration—just twice those before—and then the boilers were clean and only emptied once in six weeks. After considering the matter the plant was so arranged as to be able to inject the oil in small quantities while the boilers were in use, and after that about 1 quart per week was given to each boiler that was 5 feet diameter by 18 feet long. Kerosene must be used with judgment, for too much will undoubtedly ruin a boiler. The amount needed to do the work is very little. It stated that the above happened in 1875, and that the same battery is in use to day and in good condition, and that the average life of a boiler in that region heretofore has been about five years.

#### The Manufacture of Oxygen.

MM. Brin, of Passy, are producing oxygen on rather a large scale by the barium-oxide process. They have two large retort furnaces regularly going, filled with retorts of 9.2 feet length and 6.2 inches in diameter. In these retorts they calcine barium oxide, passing over it a stream of air which has first passed through quicklime to free it of carbonic acid. During this calcination the heat does not exceed about  $500^{\circ}$  C., at which temperature the barium oxide absorbs oxygen, becoming peroxidized. The nitrogen is drawn off and passed into gasholders, to be used for making ammonia, &c. When the barium oxide has absorbed as much oxygen as it can, the heat is raised to about  $800^{\circ}$  C., at which temperature the peroxide is decomposed, giving up again the absorbed oxygen, which is drawn off and pumped into a gasholder. MM. Brin make use of the oxygen so collected in many ways, one being the application of it to the purification of water. Filtered water is placed in a cylinder and saturated with oxygen gas at 300 pounds pressure to the inch. All organic matter is destroyed and perfectly pure water results.

The revival of American shipping was discussed by the New York Board of Trade and Transportation last week, and a resolution adopted that "30 cents per ton be granted by Government for every 1000 miles sailed by vessels, sail or steam, built and owned in the United States and engaged in foreign commerce, for 10 years, after which the payment to be reduced to 10 per cent. annually," as a well-devised method of reviving the decaying and almost lost shipping interest of the country.

# The Iron Age

AND  
Metallurgical Review.

New York, Thursday, June 18, 1885.

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## Substitution of Steel for Iron.

We quoted, some time since, very significant figures by Mr. G. W. Cope, secretary of the American Iron and Steel Association, bearing upon statistics of the substitution of steel for iron for other purposes than rails in this country. It was believed to be a subject worthy of closer study to endeavor to ascertain to what extent this substitution was going on in other leading producing countries, with the object of comparing the movement there with that going on here. Such an investigation is not without its difficulties, growing chiefly out of the fact that there are a good many complications. Thus in some countries no distinction whatever is made in reporting statistics between open-hearth and Bessemer metal. In the majority of cases, too, the sale of ingots and blooms in the open market makes it impossible to trace the forms into which they have been worked. This was notably the case a few years ago, when a large quantity was imported into this country to be rolled into rails. In a number of instances rough approximations only are possible. From the data available we have compiled the following table, which shows the quantity of steel produced in Great Britain, Germany, France, Belgium and in this country for purposes other than rails during the years 1882, 1883 and 1884, the unit throughout being the net ton of 2000 pounds.

## Production of Steel Other Than Rails.

|               | 1882      | 1883      | 1884      |
|---------------|-----------|-----------|-----------|
| Great Britain | 644,000   | 725,000   | 842,000   |
| Germany       | 445,221   | 425,632   | 474,962   |
| Belgium       | 45,710    | 42,056    | 41,872    |
| France        | 105,600   | 118,378   | 110,000   |
| United States | 212,369   | 265,145   | 375,585   |
| Total         | 1,452,900 | 1,574,129 | 1,844,419 |

For purposes of comparison we submit the following table of the production of finished iron, or rolled wrought iron in all forms, including iron rails, the unit again being the net ton throughout:

## Production of Wrought Iron.

|               | 1882      | 1883      | 1884      |
|---------------|-----------|-----------|-----------|
| Great Britain | 3,182,418 | 3,155,185 | 2,506,140 |
| Germany       | 1,649,042 | 1,595,864 | 1,543,000 |
| Belgium       | 554,487   | 536,923   | 582,456   |
| France        | 1,182,469 | 1,075,767 | 1,047,000 |
| United States | 2,493,581 | 2,348,574 | 1,957,307 |
| Total         | 9,062,247 | 8,619,597 | 7,576,797 |

The most striking fact revealed by a comparison of these tables is that the output of steel for purposes other than rails has steadily grown in the leading producing countries named, while, on the other hand, the make of rolled wrought iron has steadily declined. Out of a total of finished iron and steel in 1882 of 10,515,147 tons, 13.8 per cent. was steel. In 1884 this percentage had risen to 19.6 per cent. in a total product of 9,421,216 tons. In these tables no crucible or puddled steel is included, nor is any Bessemer or open-hearth steel counted which has gone into the manufacture of rails.

It is curious to note in what different directions the substitution of steel for iron is proceeding in different countries. In England the industry most severely attacked of late is the manufacture of ship plates; in Germany steel has practically crowded iron out of the great wire trade of that country; in Belgium and France the manufacture of wrought iron has held its own remarkably well, comparatively speaking; in this country, as we have already shown, the principal lines of attack have been plates, bars, rods and nails.

Before touching upon the accumulating

evidence that the past has only been a prelude to the future, so far as our own iron mills are concerned, it may be of some interest to trace how the diversion of steel into other channels than rails has grown during the past few years, and, as before, we use the net ton.

## Total Production of Bessemer and Open-Hearth Steel.

|               | 1882      | 1883      | 1884      |
|---------------|-----------|-----------|-----------|
| Great Britain | 2,982,807 | 2,249,046 | 1,973,038 |
| Germany       | 1,184,491 | 1,168,722 | 1,088,010 |
| Belgium       | 196,770   | 197,792   | 198,143   |
| France        | 47,134    | 559,465   | 533,561   |
| United States | 1,856,992 | 1,788,306 | 1,672,212 |
| Total         | 6,078,134 | 5,964,860 | 5,761,964 |

It will be noted, therefore, that there has been quite steady decline during the past three years in the quantities of Bessemer and open-hearth ingots produced in the countries named. In the face of a declining consumption throughout the world the percentage of finished steel other than rails has grown from 23.9 per cent. in 1882 to 26.4 per cent. in 1883, and 32 per cent. in 1884. Nor do these figures quite cover the magnitude of the movement, since the amounts given in our first table in some cases represent the quantities of finished products, not the weight of the ingots used in producing them. It is, therefore, certainly within the mark when we say that now less than two-thirds of the Bessemer and open-hearth steel made in the world is used in the manufacture of rails, while three years ago it was nearly three-quarters. Large as has been this growth, it is, we believe, within the bounds of a conservative statement to claim that it will continue at the same pace, and is even likely to develop with accelerated speed. The preparations in this country certainly point in that direction. There is little doubt that the quantity of steel required for the manufacture of rails will be far behind that of last year. On the other hand, a number of the old rail mills are making large quantities of steel for nail slabs, wire billets and structural, merchant and agricultural shapes and castings. The principal increase will be, however, in the substitution of steel for iron for nails. Some of the plants now running, like the Riverside Works, at Wheeling, and the Bellaire plant, did not contribute very much to the total make of last year, having been only just started. The Benwood plant, at Wheeling, will add its quota this year. In addition to these the Junction Iron Company and the Laughlin Nail Company are jointly putting up two 5-ton converters, which are expected to run during the last three months of this year. The Shoenbergers, at Pittsburgh, and the Pottstown Iron Company, at Pottstown, are preparing to become makers of Bessemer steel. The Western Nail Company and the Crown Point Company have begun the erection of Clapp-Griphiths' plant, and the first works they equipped, that of Oliver Brothers & Phillips, is running. As for the projects still in embryo, their number is very large.

So far as the East is concerned, the activity is, on the whole, less striking, chiefly because the difference in the price of iron and steel is not so largely in favor of the latter. Taking the question of nails, we are informed that steel slabs cost, delivered at works, about \$30, while good puddled iron costs \$26. Taking into account differences in waste and in grinding of knives, it is estimated that the steel nails are dearer by \$2.50 to \$3 per ton. The total quantity of rolled iron required to produce upward of 7,500,000 kegs of nails was in 1884 nearly 380,000 net tons. The estimated capacity of the Riverside Works, at Wheeling, and the Bellaire plant, when in full operation, is about 300,000 tons. It would appear, therefore, that for the present there is not much more room for additional works for this specialty, even if steel should supplant iron entirely, for which there is no immediate prospect, so far as the East is concerned.

Very little has been done in this country in the utilization of slack coal except in the way of its direct burning in furnaces. Various attempts have been made to manufacture this into blocks for boiler firing, domestic use, &c., but, while they may have been experimentally successful, they have not made much headway commercially, except in one case of a works on the Hudson River, which is working up anthracite coal dust, a problem that differs in some impor-

tant features from that of making patent fuel from bituminous coal. In Europe, however, a large business is done in the manufacturing of waste coal into briquettes. A recent estimate by Dr. Gurlt, of Bonn, gives the production of briquettes during 1884 as follows:

|         | Tons.     |
|---------|-----------|
| France  | 1,000,000 |
| Belgium | 500,000   |
| England | 300,000   |
| Austria | 250,000   |
| Italy   | 150,000   |
| Spain   | 100,000   |
| Germany | 100,000   |
| Russia  | 100,000   |
| Sweden  | 100,000   |

While this is certainly a very much larger quantity than was thus manufactured 10 years ago, it is still only an exceedingly small percentage—about 1 per cent. of the total aggregate output of coal in the countries named, which is near 200,000,000 tons. It will be observed how small a part briquette manufacture plays in such coal-producing countries as England and Germany. With our cheap bituminous coal, and large and accessible coal area, the future of briquette manufacture in this country does not appear to be one of very great promise.

## The Erie Canal and the St. Lawrence Route.

The business men of Montreal are clamoring in their appeals to the Dominion Government for a permanent abolition of tolls on the Welland Canal, otherwise known as the "St. Lawrence route." The Board of Trade, Corn Exchange Association and merchants generally unite in a petition to this effect. One of these documents addressed to the Governor General represents that, owing to the reimposition of tolls and the widespread stagnation in general trade, the business of the petitioners is on the "verge of extinction," and another says "the St. Lawrence route has already lost and must continue to lose its normal share of the grain export trade of this continent unless the exceptional and onerous taxation is ameliorated." A delegation to Ottawa will spare no effort to enforce these views, but the Government will probably hesitate to yield its sanction to a measure like that of imposing an additional burden on the public treasury for the special benefit of a single province. The people at large would defeat the proposition if the question was submitted to them at the polls.

The dilemma is a serious one for Canada and instructive from the standpoint of an impartial observer. In some minds it is more than suspected that the magnificent scheme of public works initiated years ago on the other side of the St. Lawrence River is substantially a failure. Not only is the Dominion embarrassed by an indebtedness disproportionate to the population and its resources, but the advantage sought—the control of the trade of the Northwest—has not been secured. Trade seeks other channels. The fact is largely due to the superior facilities offered by railway as compared with the water routes. It may also be ascribed to the fierce competition of rival routes—the Canadians finding themselves handicapped and overshadowed by the Great Republic in its giant strides across the continent. Large as has been this growth, it is, we believe, within the bounds of a conservative statement to claim that it will continue at the same pace, and is even likely to develop with accelerated speed. The preparations in this country certainly point in that direction. There is little doubt that the quantity of steel required for the manufacture of rails will be far behind that of last year. On the other hand, a number of the old rail mills are making large quantities of steel for nail slabs, wire billets and structural, merchant and agricultural shapes and castings. The principal increase will be, however, in the substitution of steel for iron for nails. Some of the plants now running, like the Riverside Works, at Wheeling, and the Bellaire plant, did not contribute very much to the total make of last year, having been only just started. The Benwood plant, at Wheeling, will add its quota this year. In addition to these the Junction Iron Company and the Laughlin Nail Company are jointly putting up two 5-ton converters, which are expected to run during the last three months of this year. The Shoenbergers, at Pittsburgh, and the Pottstown Iron Company, at Pottstown, are preparing to become makers of Bessemer steel. The Western Nail Company and the Crown Point Company have begun the erection of Clapp-Griphiths' plant, and the first works they equipped, that of Oliver Brothers & Phillips, is running. As for the projects still in embryo, their number is very large.

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## Estimates of the Cost of Producing Pig Iron.

A number of persons plainly unqualified to speak on so important a topic have of late overwhelmed a patient public with estimates of the cost of producing pig iron, until the rage has assumed the proportions of an epidemic. There is no industry which suffers so much from guesses as the manufacture of pig iron. The important items entering into expenditure are few, comparatively speaking, and the process of evolving an "estimate" of cost is proceeded with unhesitatingly by a method following in a general way this pattern: Ore in a given locality costs about \$5 per ton, or, say, \$7.50 per ton of iron; coke, \$3, or, using 1½ tons, say \$4; limestone, 75 cents; labor, \$1.50; interest, repairs, &c., \$1; therefore the cost is \$14.75. Those who indulge in guesses on this plan presumably console themselves for the absence of exact data with the fond hope that errors may compensate themselves, or they follow the principle of dealing liberally with the furnace and ending up with the calm reflection that it ought not to cost more than that, anyhow. These are the amateur guessers who have usually no other interest in the matter than to let their light shine. Our readers will recognize the family resemblance between the ideal examples given above and the following "estimates" of the cost of Bessemer pig iron at different points in the West by a Cleveland correspondent of the Pittsburgh Dispatch:

## Pittsburgh.

|                                   | Tons.   |
|-----------------------------------|---------|
| 1/4-ton ore at \$6.75             | \$10.12 |
| 1/8-ton coke at \$2.25            | 2.60    |
| 1/8-ton limestone at \$1          | .67     |
| Labor                             | 1.50    |
| Repairs, salaries and incidentals | 1.00    |

Total cost of pig iron.....\$15.89

## Wheeling.

|                                   | Tons.   |
|-----------------------------------|---------|
| 1/4-ton ore at \$6.75             | \$10.12 |
| 1/8-ton coke at \$2.25            | 2.60    |
| 1/8-ton limestone at \$1.20       | .80     |
| Labor                             | 1.50    |
| Repairs, salaries and incidentals | 1.00    |

Total cost.....\$15.89

## Youngstown.

|  | Tons. |
|--|-------|
|--|-------|

less tonnage for the railroads, and, of course, a falling off in the receipts of the railroads, and consequently in their ability to purchase. But, on the other hand, with a short supply the probability is that prices will advance, and with this advance will come a greater ability on the part of the farmers to pay transportation, and possibly an advance in the freight rates, with, it may be, a greater ability on the part of the railroads to undertake the needful repairs, and possibly extensions. A considerable deficiency in the wheat crop of the country might have the effect of enabling the railroads to secure higher rates for what they do transport. The increased cost of wheat that would come with such a deficiency would also have the effect of increasing the cost of living, and, in such a condition of affairs as the present, anything that adds to the prices of the necessities of life decreases the purchasing power of the wages received by the working class, and this prevents that increased consumption which is necessary to a marked revival of business. It is, of course, possible that our deficiency of wheat may be somewhat neutralized by a slight excess of the European yield, and consequently the demand from abroad may not be so great as it would be in case of the least deficiency in the crops other than American depended upon by European countries. However, it is evident that the ruling prices for wheat will have a marked influence upon the business prospects of the remainder of the year 1885 and the beginning of 1886.

#### The Labor Situation West.

Our latest mail advices, bearing date of June 16, report the situation in connection with the labor strike in the West as somewhat mixed, but the indications are that the manufacturers have again thrown away the opportunity to secure a reduction in wages somewhat proportionate to the reduction in the selling price of iron and to the wages paid in other sections. To the utter surprise of the entire West, on last Thursday the secretary of the manufacturers' committee notified the president of the Amalgamated Association of the desire of the manufacturers for another conference. There seems to be a mystery, as yet unexplained, as to the occasion of this call. The majority of the manufacturers' committee themselves were ignorant that it was to be asked for until they received the notice to attend. Two reasons, either or both of which would be a sufficient explanation, have been advanced by the Pittsburgh papers. One is that the officers of the Amalgamated Association were desirous of another conference, but, as they called the last one, they wished that this one should be called by the manufacturers, and so intimated to them. The second explanation is that certain manufacturers in Pittsburgh had decided to sign the scale, and the conference was called by the manufacturers' committee for the purpose of getting the best terms possible before these signatures were appended. As yet nothing has become known which justifies the first assumption, except the signing of the scale by Oliver Brothers & Phillips, and the reported demand of Mr. Oliver that their firm be represented on the conference committee would give grounds for the belief that it was the second reason that led some of the manufacturers' committee to reconvene the conference.

The conference asked for was held on Saturday. The chief points of difference between the manufacturers and the Amalgamated Association were two, commonly referred to as the "old-rail or cracked iron clause" and the "sheet scale." Outside of these there have been some minor points of difference, chiefly relating to the way that the scale should decline between  $2\frac{1}{2}$  and 2 cents, the manufacturers claiming that the decline between  $2\frac{1}{2}$  and 2 cents should be the same as the ratio of reduction between 3 and  $3\frac{1}{2}$  cents, the Amalgamated claiming that the scale at 2 cents should be 10 per cent. less than the price paid on  $2\frac{1}{2}$  cents, and that this 10 per cent should be distributed between the 2 and  $2\frac{1}{2}$  cent card. In this respect the manufacturers yielded to the Amalgamated Association, consenting that the scale at 2 cents should be a straight 10 per cent. reduction from the price paid at  $2\frac{1}{2}$  cents. In connection with boiling, the Amalgamated Association had also made a demand for a scale of prices for boiling swarth. The manufacturers conceded this likewise; this left only the cracked-iron clause and the sheet scale in dispute. Prior to the conference the cracked-iron clause stood as follows:

It is understood that for all finished iron, cracked or flawed, worked on any finishing mill, made out of old rails, the same shall be paid for.

This was altered at the conference so as to read:

It is understood that for all finished iron worked on any finishing mill, made out of old rails or old-rail iron, 10 per cent. extra above current prices shall be paid for same.

The words in italics indicate the changes made. The manufacturers' committee positively refused to agree to the retention in any shape of the old-rail clause, believing not only that the form in which it was presented was a virtual increase over the original form, but that the clause in any shape was objectionable, on the ground that it was a premium for bad work and was only the precursor of future demands. Heretofore, as a rule, only iron that was merchantable has been paid for; this was a proposition to pay

for iron that was not merchantable, and, if it was conceded, there was nothing to prevent a demand another year for payment for muck bar, and then for steel that was not merchantable. In the scale as signed by Oliver Brothers & Phillips there was a still further change made in this cracked-iron clause so as to read as follows:

It is understood that for all finished iron worked on any finishing mill "made out of a pile" containing two-thirds or more rails or old-rail iron, 10 per cent. extra above current prices shall be paid.

The other point of difference was the sheet scale. As we have heretofore explained, all the scales in force up to May 31, 1885, were reduced 10 per cent. except the sheet scale. No reduction was conceded upon this, but it stands at 2 cents the same as at  $2\frac{1}{2}$ . The reason given for this is that some years ago, when the sheet scale was made, the prices paid at that time were a reduction, and as they had stood the reduction at that time they ought not to be asked to concede any at present. The reply to this is that, while it may have been a reduction at certain mills, at most of the mills and on most of the iron made, it was an increase, the price in many cases for No. 24 at that time being \$7 and \$7.50, and the price made on the scale being \$8.

It is impossible to tell at this writing what the result of the conference of Tuesday will be; this will be given in our Pittsburgh market report, but the indications are that, unless the workingmen concede the demand of the manufacturers regarding the old-rail clause and the reduction in the sheet-iron scale, no conclusion will be reached. The manufacturers believe that they have already conceded more than they should in accepting the workingmen's idea of a 10 per cent. reduction, and the pressure upon them to refuse to sign the scale unless the Amalgamated Association strike out the old-rail clause and reduce the sheet scale to 10 per cent. will be too great for them to withstand.

There is a prevalent belief among the manufacturers that the Amalgamated Association is so weak and there are such dissensions in its ranks that the signing of the scale by Oliver Brothers & Phillips, even if to them are joined some others that possibly may sign, by no means gives a victory to the Amalgamated Association. That the association is weak—worse than ever before—and that there are dissensions which in a very short time would lead to their disruption by the acceptance of the manufacturers' position, it is useless to deny. They are facts, and if, in the face of these known facts, the manufacturers of the West have not the courage to demand what they should have, and to wait until they get it, they deserve defeat. It is also evident that, should defeat come this time, the Pittsburgh manufacturers are responsible for it. They cannot, as they have heretofore attempted to do, divide the responsibility with mills west of them. Almost without exception mills outside of Pittsburgh are standing firm and insisting not only on the demands of the manufacturers, but that the last proposition of the manufacturers be withdrawn and a more radical one, providing for a greater reduction, be insisted upon.

The result of this contest is with the Pittsburgh manufacturers. It is all very well for them to sign the scales and give reasons why they must sign them. This one may urge that he has orders; another set forth his necessities; another that he makes various articles at his mill besides iron, and must sign in order to run; and a fourth may be actuated by no higher motive than a desire to be sharp and take some trade while his neighbors are idle. But, whatever may be the reason for signing the scale, each signature simply increases the probability of the defeat of the manufacturers, and the victory of the weakened and disunited Amalgamated Association. The Pittsburgh manufacturers have no enviable reputation among the iron manufacturers of other sections of the country, and if in the face of the weakness of the Amalgamated Association they suffer defeat, they certainly cannot take exceptions if the respect in which they are held by the iron trade of the country is not increased.

RANDALL AND THE TARIFF.

There having been ceded to France of Annamite territory under the Second Empire the six provinces of Lower Cochinchina, and, through the present treaty of peace, the Province of Tonquin, Annam is now reduced to a population of 6,000,000, occupying an area of 163,500 square miles, but without counting the tributary States of Laos and Moi. For all practical purposes France is the owner of the whole of Annam, Cochinchina and Tonquin, and has thus the undisputed sway over a vast country inhabited by a sober, industrious, hard-working people, and teeming with most valuable resources, especially tin, silk and anise-seed oil, the latter being a very valuable specialty, peculiar to the country. All who have been on the spot agree that in tin and silk Annam, and Tonquin in particular, will have a great commercial and even industrial future, for the Annamites spin and weave silk to perfection.

In order to indemnify themselves for the cost of the war the French intend to discriminate against foreign merchandise imported, as well as in transit, to China, and furthermore levy extra port dues on vessels under foreign flags. These duties and dues will, however, be moderate, and after a couple of years France may find it to her interest to place foreign goods and flags on the same footing with French. But even supposing that this liberal policy should fail to be adopted, the development of the resources of Annam, and Tonquin in tin and silk will of itself have an important bearing on both commodities in the world's markets. Capitalists have formed companies at Paris and Lyons for the development of the resources of the new acquisition. Lyons, in particular, is bent on making the most of Tonquin for a permanent growing supply of silk, the silkworm disease having crippled French production at home. Reeling establishments will be created to reel silk in Tonquin after the European style, and positive results may be expected from this enterprise.

The canal system is to be enlarged and completed, the ports deepened and improved, and railroads and telegraphs introduced, of which that country possesses none thus far. Cochinchina is a kind of granary for China, the Philippine Islands and Java, no less than 400,000 tons of rice being exported from Saigon annually. The development of these countries under French rule and management will be watched with interest by all commercial nations.

#### WASHINGTON NEWS.

(From Our Special Correspondent.)

WASHINGTON, D. C., June 16, 1885.

Much inquiry is being made by exporters of American manufactured articles for information respecting the Mexican tariff. It should be stated for the information of such persons that the old Mexican tariff has been repealed, to take effect on July 1, when the new tariff adopted by the Mexican Congress will go into effect. The Government has received official copies of the new tariff, and is having it carefully translated for public information. It is expected to be ready by July 1. It might be well, therefore, for exporters of American manufactures to understand that the present schedules of Mexican customs have been materially changed.

#### RANDALL AND THE TARIFF.

Ex-Speaker Randall has left the city for the summer. He will give himself up to entire rest in anticipation of a long and busy session of Congress next winter. In October he will call the Committee on the Steel Producing Capacity of the United States together, when they expect to close up their labors. Speaking of the tariff, he said: "The subject is most likely to be reopened. In my opinion, the best tariff we could have is embodied in theory in the tariff plank of the Democratic national platform. It might be enacted into a law. It embraces the theory of tariff revision upon which I stand."

#### THE OHIO CAMPAIGN.

In a private letter from Senator Sherman, received by a friend in this city, the Senator says that his visit to the Pacific Coast has been exceedingly interesting. He found that the people were giving closer attention to the effect and benefits of the American economic system as represented in a protective policy toward American manufacturers. His speeches in that line were well received. In regard to the Ohio campaign, the nominations then not having been made, however, he said that the tariff issue would be conspicuous, as the people insisted on the restoration of the duty on wool to its position in 1867. The Senator will be in Ohio next week.

#### CONSULAR REPORTS.

The three volumes on labor in Europe and other continents, referred to in this correspondence some time ago, are now ready for distribution. It is the most comprehensive and exhaustive work of the kind ever published. The three volumes embrace 2500 pages. The first two volumes contain the reports from the consuls of the United States in the several countries of Europe on the rates of wages, cost of living to the laboring classes, past and present wages, &c., in their several districts, in response to a circular from the Department of State requesting information on these subjects. The Secretary's letter reviewing the reports presents a valuable synopsis of the whole subject by countries. As a repository for information on the subject of labor, these voluminous reports will supersede every thing in that line.

#### RUSSIA WHEELING INTO THE LINE OF PROTECTION.

The Department of State has information of an increase, just imposed by the Russian Government, in the customs duties on cer-

tain grades of silk, amounting to 40 to 80 cents per kg., or an advance of from 18 to 36 cents per pound. The dispatch says: "This measure of the Russian Government has been taken in order to encourage and promote sericulture or the growing of silk in Russia, which country (in some of her provinces particularly) commences to produce some very good silk, and which industry, it is believed, will be very greatly advanced in consequence of this action." At present gossamer silks, one of the class made at a higher rate in Russia, are admitted into the United States free of duty.

#### THE TARIFF IN SWEDEN.

Minister Thomas, of Stockholm, reports that the large landed proprietors of Sweden are making great efforts to secure protection to the products of their estates. In the Swedish Diet, in January, a number of motions were made in both Houses to impose duties on the agricultural products of the Kingdom. Such articles, except cheese, are now duty free. The subject was referred to the Committee on Ways and Means. The dispatch says: "The proposed duties are for protection pure and simple. The exigencies of the Swedish Treasury demand no new tax. Not only that, but in so large a measure do the present revenues of Sweden exceed her expenses that the King, in opening the Diet, recommended a reduction of 30 per cent, on some of the chief taxes of the realm." It is shown that the pork import of Sweden amounts to \$2,000,000 a year, almost exclusively the product of the United States. In a later dispatch Minister Thomas reported that in his opinion all propositions to impose duties upon agricultural products imported would be rejected. He adds: "Much interest is manifested in the question throughout Sweden. Public meetings are held in many cities, and long petitions both for and against the proposed duties are forwarded to the Diet."

#### FRANCE AGAINST AMERICAN AGRICULTURE.

The Department of State has received the French texts and translations of the new French tariff law, imposing certain new duties on live animals and butcher's and salted meats imported from foreign countries, and imposing certain duties on cereals. The rate is as high as 25 francs a head on oxen, and 7 francs on fresh and 8.50 francs on salted meats per 100 kg. Wheat and rye flour per 100 kg. range from 6 francs for products of European origin or imported directly from countries other than Europe, to 9.60 francs for products of extra European origin imported from European bonded warehouses.

#### TARIFF IN NEW SOUTH WALES.

A complete list of the customs duties of New South Wales, revised to January 15, 1885, gives the following duties in United States currency on the articles named:

|   |        |
|---|--------|
| Iron—Galvanized in bars, bundles or sheets, or coiled, per ton. | \$9.75 |
| Galvanized manufactures, per cwt.                               | .75    |
| Wire, per ton   | 4.90   |
| Rails, per ton  | 9.75   |
| Shot, per cwt.  | 1.25   |

While there are but 70 articles on the list, the list includes some of the most important American products.

The Victoria tariff embraces 93 different articles upon which an ad valorem duty of from 10 to 25 per cent. is levied, 237 articles upon which they pay a special tax, and 243 articles are admitted free. Among the latter articles are chain anchors, copper ore, galvanized iron, steel, cutlery, hardware, ironmongery, agricultural machinery (established 1883), tools, utensils, carriage materials and steam engines pay 25 per cent. ad valorem.

Judge Treat having, during a trial in 1882, cut short a discussion of the relation of the four pointed barb patent (called the "Ross") and the Glidden (two-pointed) barb by saying that he considered the four-pointed an infringement on the Glidden, it is now inferred that the suits based on patents covering both the two and four pointed barbs, and owned by Washburn & Moen Mfg. Co. and L. L. Ellwood, which are now on docket, will result in favor of plaintiffs; and, therefore, most of the unlicensed manufacturers of barbed wire (called "moonshiners") are anxious to secure postponements in suits pending. It being too late for the June term, they will make "hay while the sun shines;" and should a trial and decision be reached in September, and a settlement with Washburn and Ellwood be impossible, it is probable that some will remove to districts in which another effort can be made, and resort to the secluded operation which secured for them the name of "moonshiners." There is, however, considerable loss profit now than during the time the royalty was \$15 per ton, and, therefore, smaller inducement to incur the hazardous competition that has been waged since 1882.

The formality of a commissioner's sale of the realty and machinery of the Harrison Wire Company was complied with on the 11th and 13th insts. All of the holders of first-mortgage bonds were represented at the sale on the 11th, and Messrs. Geo. T. Crane, of Kidder, Peabody & Co., New York, and James Cummins, of St. Louis, representing 149 of the 150 bondholders were the purchasers, bidding only \$30,000, in absence of other bids. Objection to approval of sale having been made on the 13th inst., the court permitted bondholders to make an offer of \$100,000, which was accepted.

An improved street rail is being substituted on Sixth street, St. Louis. It complies with the city ordinance in having a 5-inch surface and an upper surface of same shape as other tram or street rails, but instead of the wooden supports it has the advantage of a base, similar to steam road rails. The rails are 30 feet long and weigh 56 pounds to the yard. The ends are connected by fish bars, and the rails are supported by steel blocks 5 inches high, which rest on white oak ties placed 6 feet apart.

The Consolidated Vapor Stove Company, of Cleveland, Ohio, have filed two suits in the United States Circuit Court, at St. Louis, against the St. Louis Gasoline Stove Mfg. Co., and against Stafford, Lighthorn and others, doing business under the name Safety Gasoline Stove Mfg. Co. These be-

long to a series of suits which the Consolidated Company are bringing to protect patents owned by them. In these suits, it is alleged, the defendants have infringed upon patent rights granted Charles Prentiss, March 4, 1873, for an improvement on gas heaters. Prentiss transferred his rights to Martin Hull in March, 1873. Hull applied for and obtained a reissue of the patent obtained April 24, 1877. He transferred his rights to the Hull Vapor Stove Company July 22, 1879, and in turn the patent was, December 4, 1883, transferred to the plaintiff company. Injunctions and accountings were asked for.

#### The Brennan Torpedo.

Experiments have for some time past been carried out to test the powers claimed for a new torpedo invented by Mr. Brennan, an Australian, and offered by him to the British Government. The Admiralty granted to the inventor the use of a casemate on the upper tier at Garrison Point Fort, Sheerness, and a torpedo factory was erected outside the fort, with a tramway running down to the sea beach. With these advantages and ample sea room in front the preliminary trials have taken place, and the mechanism has been so far perfected as to admit of an official inspection, which has just taken place, and is stated to have proved so satisfactory that the Admiralty have agreed to adopt the torpedo as a part of the national armament. The new torpedo, which is of the aggressive class, is described as distinct in principle from the Whitehead, the Harvey or any other system known in the service. In the many trials which have taken place in public a machine something like the section of a boat has been seen to descend to the water's edge by means of a carriage on the tramway, and plunge into the sea, through which it has shot at a marvelous speed, estimated by some observers at 50 miles an hour.

The torpedo is impelled by a steam engine, which is stationed within the fort, and acts upon it by winding in very rapidly two wires which are coiled around reels revolving inside the machine. As the wires are independent of each other, and actuate different propellers, the torpedo can be steered from the engine with great accuracy, and it has actually performed journeys of 2000 yards, working in and out among the shipping, finally to be let go to strike the object aimed at, while the wires are drawn in for further use. The operator stands on the top of the fort and directs the course by a wheel or lever, and the same thing could be done from a ship by the commander in the conning tower. It is even practicable to stop the messenger in full flight and send it on again. The jets of light are produced by some chemical agency, and are simply to indicate the position of the torpedo at night; but, being screened in front, are visible only to the observers in the rear. Traveling with very little of its body above water, it would scarcely be discerned by an enemy until too close for resistance or escape, and as its speed increases the harder it is pulled, the last part of the journey can always be the fastest.

The judges of awards at the New Orleans exposition, after careful examination and comparison, have declared that the firm of Riehle Bros., proprietors of the Philadelphia Scale and Testing Machine Works, are entitled to three first-class medals—one for their self-adjusting railroad track scales, with rocking bearings; one for their spring-testing machine, and one for their well-known furnace-charging scales. This is considered a high compliment to Philadelphia mechanics and one well deserved by this enterprising firm.

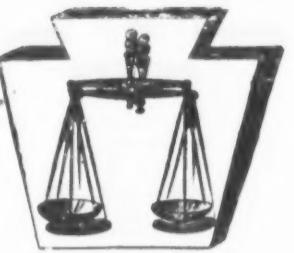
The Desloge Lead Company stockholders held their annual meeting June 9, at the office of S. W. Cobb & Co., St. Louis. The following were elected as composing the Board of Directors: Louis Fuz, George L. Allen, Firmin Desloge, John F. Valle, Jules Desloge, C. B. Parsons and S. W. Cobb. The new board organized with the following officers: President, Louis Fuz; vice-president, Geo. L. Allen; secretary, S. W. Cobb; superintendent and manager, Firmin Desloge.

The Shultz Belting Company, manufacturers of patent rawhide belting, of St. Louis, recently made shipments of their products to Belgium and Denmark.

The Joliet Enterprise Company, claiming under a patent granted L. E. Sunderland, assigned to them, and on their petition reissued May 12, 1885, a patent right to the principles of the construction of a barbed-wire machine, have sued the St. Louis Wire Mill Company and Wm. Edenborn for infringement, asking the United States Circuit Court to restrain them by an injunction, and demand an accounting.

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# HENRY DISSTON & SONS,



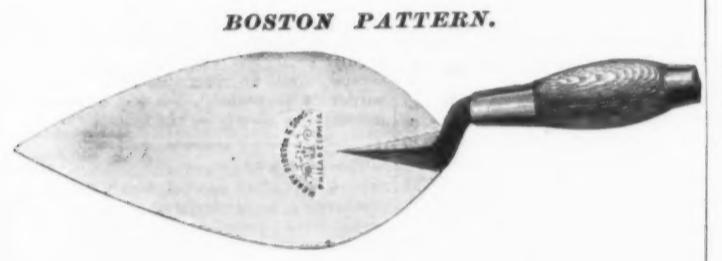
## KEYSTONE SAW, TOOL, STEEL AND FILE WORKS, PHILADELPHIA, PA.



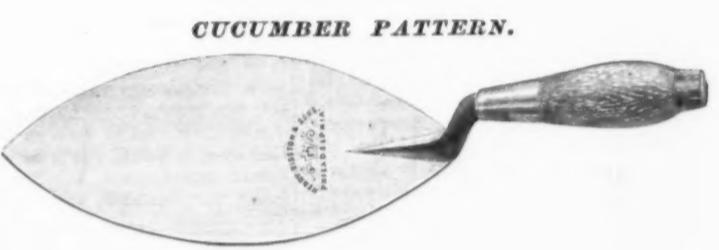
PHILADELPHIA PATTERN.



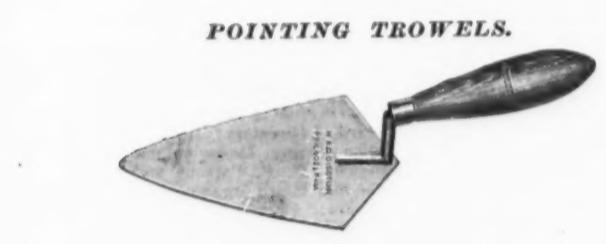
LONDON PATTERN.



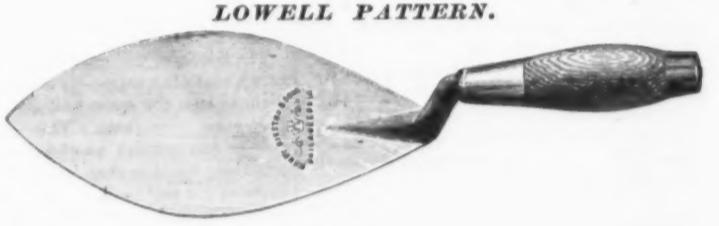
BOSTON PATTERN.



CUCUMBER PATTERN.



POINTING TROWELS.



LOWELL PATTERN.



POINTING TROWELS, SOLID SHANK.



BRICKLAYERS' POINTING TROWELS.

We desire to call the attention of the Trade to the Superior Quality of our manufacture of

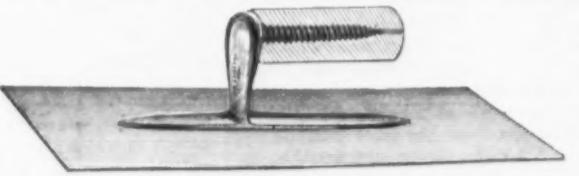
### BRICK, POINTING, PLASTERING, GARDEN

AND ALL OTHER SHAPES AND STYLES OF

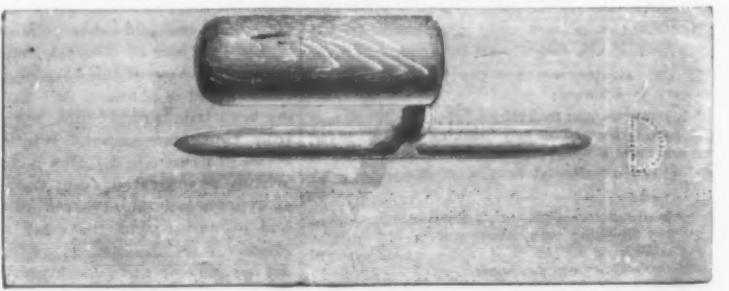
### SOLID SHANK TROWELS.

Our Brick Trowels are made by a new process, which makes them a true taper from heel to point, giving them a spring and elasticity which none others possess. The handles are all made from white gum wood, which is more durable and less liable to split than any other wood, and with confidence we guarantee them to be the Best Trowels in the Market.

No. 1 PATENT TANG PLASTERING TROWELS.



No. 2 PLASTERING TROWELS.



We also Make a Full Line of the Above Goods in the Keystone Quality; Samples of Either will be Furnished on Application.

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## Special Notices.

## RECENT BOOKS.

Prescott.—*Electricity and the Electric Telegraph*. By George B. Prescott; 6th edition, revised and enlarged, 670 illustrations, 1120 pages, 2 vols, 8vo, cloth. \$5.

In the present edition of this well-known treatise all available means of information have been resorted to to make the work historically and descriptively accurate. Special attention has been given to voluminous researches and experiments of German electricians, hitherto almost inaccessible to American students, except in scattered publications. The discoveries, inventions, and improvements of the past few years, (especially those relating to duplex and quadruplex methods of transmission, and to the improved type-printing apparatus) are described and illustrated. Many illustrations of high merit accompany the descriptive portions of the work. The unusual facilities of the author for research and experiment make this volume valuable to the profession, and a reliable guide to the student, and of interest to all interested in electrical science.

*The Fireman's Guide; a Handbook on the Care of Boilers*. By Teknologföreningen, T. I., Stockholm. Translated from the 3d edition, and revised by Karl P. Dahlstrom, M. E.; 28 pages, 12mo, cloth. \$0.50.

This little book contains the plainest rules and regulations as to how a boiler should be fired and managed. It was originally written and published in Sweden by a society of experienced engineers, with a view of lessening the number of boiler explosions which so frequently occur through the neglect or incompetency of the attendant. The book has had a deserved success. The arrangement is excellent, the instruction being simple and yet explicit.

*Hower's Lightning Slate Reckoner*, By F. M. Hower; 54 pages, 12mo, pocket-book form. \$1.50.

This book is the production of a practical quarryman, and contains tables relating to 33 practical sizes of roofing slate, arranged in convenient form. The tables are calculated for 3-inch lap. In the first column the number of slate is given, and in the second the number of square feet of roof which will be covered. The square feet are arranged in numerical order from 1 to 1000, or 10 squares. One of the most important in the book is a table of ratios giving the variation in the lap and the amount of nails required to lay a square of each of some 33 sizes of slate when used 2-inch lap, 3-inch lap and 4-inch lap.

Sent, postpaid, on receipt of the price by DAVID WILLIAMS, Publisher and Bookseller, 83 Reade St., New York.

## IRON COMMISSION MERCHANT,

Well-established in adjacent city, and representing some special brands of Pig Iron, &c., desires to open an office in New York City in order to reach more readily the numerous iron Works (Foundries, &c.) in that vicinity, and wishes an energetic gentleman of some means and experience to join him, who will assume the general management of New York office. Address promptly for interview.

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A second-hand Corliss Engine, 12 x 24; can be seen running at 11 and 13 Hubert Street. Delivery about August 1st. Apply to GINNA & CO., 110 Reade Street, New York.

**WIRE NAIL MACHINES.** Wanted, by an experienced German wire nail maker, to join some party to start the manufacture of all kinds of wire nails and wire tacks, or will take charge over a wire nail manufactory.

Address "WIRE NAIL." Office of The Iron Age, 83 Reade St., New York.

**Hardware Business for Sale, OR PARTNER WANTED.**

The Stock and Fixtures of the late James Marshall, at 48 Warren street, New York.

Enquire on the premises.

A energetic and experienced man desires a position managing a steel or iron works, or a foundry, conveniently with all the parts of the Rolling Mill business. Can select stock, design rolls, for difficult shapes or Merchant Bar, Ralls, &c. Has special knowledge with regard to Wire Rod Mills. Can make arrangements to have the knowledge available to intelligently oversee work of all kinds embraced in the mill business. Address "MANAGER." Office of The Iron Age, 83 Reade St., New York.

**WANTED—Salesmen to sell our patent Hand Saw to the Trade on commission, in addition to their regular line of goods. State route wanted. Address THE C. TENNEY HARDWARE CO., Brooklyn (E. D.), N. Y.**

**WANTED—** Situation in a foundry (copper or city) to be a Frenchman, wire manufactory. Has been superintendent of the largest foundry in Paris. Able to take entire charge. Has a thorough practical knowledge of molding, inventor of a new system for the rapid casting of solid columns for buildings. The best of references. L. DECAEN, 125 East 17th Street, New York

## Special Notices.

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## MACHINERY.

1 Pit Lathe—will take in a pulley 104 x 24 in. and handle 4 tons easily. Very cheap.

1 1/2 ft. swing Engine Lathe, 10 ft. bet. centers.

1 Engine Lathe, 1 ft. 6 in. swing, 30 ft. bet. centers.

1 1/2 ft. 45 in. " 30 ft. bet. bed. Cheap.

1 1/2 ft. 33 " 10 1/2 " Pond.

1 1/2 ft. 28 " 16 " Fifield.

1 1/2 ft. 19 " 7 " Whitcomb.

1 1/2 ft. 18 " 8 " Johnson.

1 1/2 ft. 15 1/2 " 7 1/2 " Price.

1 1/2 ft. 15 " 6 " Cheap.

1 1/2 ft. 13 " 6 " Gould.

1 Screw-Cutting Foot Lathe, 8 in.

1 Foot Lathe, 8 in. and 10 in. swing 3 ft. bed.

1 Iron Planer 32 x 32 in. x 9 ft. New Haven.

1 1/2 ft. 24 x 18 in. x 4 ft. Freeland.

1 Iron Planer, 20 in. x 20 in. x 5 ft. Gould.

1 1/2 ft. Upright Drill, wheel feed, back geared.

1 1/2 ft. Drill, wheel feed, back geared. Gould.

1 1/2 ft. Drills, wheel feed.

1 Blacksmith Foot Drills.

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1 Shaping Machine 12 in. stroke. Very heavy.

1 1/2 in. Gould Shaper.

1 1/2 in. Hand Lathes.

1 Lincoln Milling Machine Jones & Lamson.

1 Pulley Hub Drilling and Tapping Machine.

1 Slitting Machine, center 54 in. Cheap.

1 High Speed Drill, 16 in. Jaw.

1 Circular Slitting Shear, center of 44 in. Hand Bar Iron Shears.

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1 Hydraulic Wheel Press.

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1 Double Head Bolt Cutter.

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1 1/2 ft. Palmer Spring Hammer.

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1 Grindstone and Frame.

1 1/2 ft. Harrington Chain Hoist, 24-ft. lift.

1 Paint Mill, 1 1/2 ft. Paint Mixer, Kent's.

1 Fountry Rattle Mill or Tumbling Barrel.

1 1/2 ft. E. Horizontal Engine.

1 1/2 ft. Vertical " and Boiler combined.

1 1/2 ft. " Boiler.

The above are all in first-class condition, and will be sold at very low figures.

Have also a lot of new machinery for sale at below prices.

This list is changed every week, and if it does not contain what you want, write me, stating particulars. Ma hairy bought, exchanged or sold on commission.

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A rare opportunity is offered a party wanting to buy a well-selected stock of Hardware, Iron, Stoves, Tinware, House-Furnishing Goods, Agricultural Implements, Paints, Oil, Glass, &c. &c. Also one of the best business situations in the country has been used by a Hardware and Stove store for past 10 years. Philadelphia can be reached within 3 hours and New York City within five hours by direct rail to both cities. The store building will be sold at a fair rate or leased at a reasonable rent. The owner is compelled to close out my stock and retire from business. Apply to E. J. FRY, Tamaqua, Pa.

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A good, clean stock of Hardware, Stoves, Tinware, and the store building, in the best town in North Dakota. All worth about \$5000. Business established and paying well. Good reasons for selling. Will prove to be a good buyer's satisfaction that the above are facts. Address

SMART & SHEPHERD, Brockville, Ontario, Canada.

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A good, clean stock of Hardware, Stoves, Tinware, and the store building, in the best town in North Dakota. All worth about \$5000. Business established and paying well. Good reasons for selling. Will prove to be a good buyer's satisfaction that the above are facts. Address

LOCK BOX 483, Lisbon, North Dakota.

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E. H. WILSON & CO., Philadelphia.

## FOR SALE.

A well-selected stock of Shelf and Heavy Hardware in the most prosperous city in the West. Largest stock and trade in the city; invoice about \$20,000; if taken at once will be sold at a bargain.

Address "HARDWARE 1885," Office of The Iron Age, 83 Reade St., New York.

## FOR SALE.

A first-class Hardware and House-Furnishing business on Broadway, Brooklyn. Established 18 years. Address "ALLEN," Office of The Iron Age, 83 Reade St., New York.

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Address "HARDWARE 1885," Office of The Iron Age, 83 Reade St., New York.

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A second-hand Corliss Engine, 12 x 24; can be seen running at 11 and 13 Hubert Street. Delivery about August 1st. Apply to GINNA & CO., 110 Reade Street, New York.

## FOR SALE.

A second-hand Corliss Engine, 12 x 24; can be seen running at 11 and 13 Hubert Street. Delivery about August 1st. Apply to GINNA & CO., 110 Reade Street, New York.

A Monitor Lathe, 8-inch turret, 14-inch swing and 3-inch belt; also a Spineing Machine for cutting slots on the inside of brass wheels; diameter of inside of wheel, 1/2 inch.

THE NATIONAL CASH REGISTER CO., Dayton, Ohio.

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At 116 Chambers street, the first loft, either temporary or permanent; well adapted for Manufacturers' Agents or other business, being already shelled. Apply to AMERICAN TOOL COMPANY.

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Manufacturers of Machinery, Furniture, Wooden Ware, Sash, Doors and Blinds, Pumps, Plows, Carriages, Windmills, &c., that contemplate change of location, can learn something to their advantage by addressing

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## ROOT'S ILLUSTRATED Hardware Price Books,

which were successfully introduced the past year, have been improved for 1885, by using extra heavy interleaving paper, with red ink down rulings, and by adding 1000 EXTRA UNBOUND PRINTED AND ILLUSTRATED PAGES, making the book 1000 pages in all, on which stocks vary, of which each house can insert such as interest them. These 1000 pages have appropriate headlines and are page'd appropriately for insertion in their books, and are sold at a discount. The 239 pages, bound in the regular books, show mainly the lines on which all leading American hardware stocks agree, carefully selected in the interest of the consumer. The 1000 extra pages are placed after each book, for pasting in, and are bound with dark-colored genuine morocco leather flexible cover and flaps, with pocket inside the cover; also dark-red polished edges. PRICE, \$7 per copy.

NOTICE.—Like No. 1, but Red Russia leather. PRICE, \$7 per copy.

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SPECIAL PRICES given to houses ordering six or more copies at one time.

In ordering stock, if you prefer Tin, Wood and Glass, &c., not so stated, complete book will be sent including these items. These Books are indispensable to hardware buyers, travelers and clerks, saving often \$100 to \$200 in time, and giving better satisfaction than those made in the ordinary way. Please write for circulars for further details, with samples of paper. Address orders to

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## FIRST-CLASS ORDER.

Universal Milling Machine. Brown & Sharpe.

Lincoln Pat. Putnam.

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Planer, 12 x 17 x 4 ft. Whitcomb.

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One Engine Lathe, 20 ft. bed, 42 in. swing. Bement's make.  
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One Engine Lathe, 87 in. swing, 20 ft. bed. Geared in Face Plate, Screw Feed, Compound Rest.  
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One Iron Planer, planes 24 ft. long, 62 in. x 62 in. Excellent condition.  
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One 12-inch Slotting Machine.  
One Axle Lathe.  
Two Durrell's 7 Spindle Nut Tappers.  
Send to lists New and Second-hand Tools, too long for publication.

**The GEO. PLACE MACHINERY CO.,**

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**WHAT ARE YOU LOOKING FOR?**

I have on hand a very large stock of New and Second-Hand Machinery, comprising  
ENGINES, Automatic and Slide Valve,  
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STEAM AND BELT PUMPS,  
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STURTEVANT BLOWERS.  
Write and state your wants, and will send full particulars.

**HENRY I. SNELL, M. E.,**  
135 N. 3d Street.  
**PHILADELPHIA.**

**For Sale.**

Located in a good manufacturing town in New York state a clean and well-selected stock of Hardware, Steel, Tin, &c. This is a good business, working three men; good business done in the store; stock about \$20,000; reason for selling, poor health. Address for particulars.

Office of *The Iron Age*, 83 Reade St., New York.

**50 PER CENT.**

Below cost of production. Stock of Engines and Boilers is too large and must be reduced, therefore the sacrifice. All new and complete at factory, and guaranteed A No. 1 first-class.

8 H. P. Engine, \$135. Boiler, \$175.  
10 " " 178. " 217.  
12 " " 214. " 263.  
20 " " 250. " 308.  
25 " " 275. " 347.  
30 " " 350. " 398.  
35 " " 375. " 456.  
40 " " 425. " 514.  
50 " " 550. " 656.

Send for Catalogue.

H. M. SCIPLE,  
107 N. Third St., Philadelphia.

**SCRAP IRON  
FOR SALE.**

300 tons R. R. Spiral Spring Steel.  
200 " " Iron and Buggy Spring Steel.  
200 " " Mixed and Plain Steel.  
200 " " No. 1 Wrought Iron.  
200 " " Sheet and Hoop Iron.  
200 " " Cast-Ironings.  
200 " " Cast-Iron Boring.  
200 " " Grate-Bars and Burnt Iron.

Also a large assortment of New and Second-hand Machinery, Tools, Belting and Metals.

**A. LIEBERMAN,**  
Nos. 1448 and 1501 to 1507 State St., Chicago, Ill.

**For Sale.**

A half-interest, or the entire Stock of Hardware, Stoves and Tinware; all clean, new and well-selected; situated in the Denver of the Southwest; will inventory about \$20,000; reason for selling, ill health.

Address P. O. Box 126,  
El Paso, Texas.

**Special Notice.**

New York, May 1, 1885.  
We beg to notify our customers and the trade generally, that, in order to secure greater convenience and efficiency in filling orders for the Beaudry Hammer and our other goods, in New York and Pennsylvania, and adjacent territory, we have established a

**BRANCH OFFICE and WAREHOUSE**

No. 49 Dey Street, NEW YORK CITY,  
from which office all our business in that section will be transacted and filled.

**BEAUDRY & CUNNINGHAM.**

Manufacturers of the Beaudry Hammer,  
Principal Office, Mason Building, Boston, Mass.

Also, Machine Knives, Hardcoal Heating  
Forges, Shars, Steam Hammers, Gas Engines,  
Iron and Steel.

**LEIGH'S  
DISCOUNT BOOK**  
Specially arranged for the use of the

**HARDWARE TRADE.**  
Acknowledged by ALL the best work of the kind ever published. Price by mail \$1.00.  
Address E. B. LEIGH,  
Sec'y The American Brake Co., St. Louis, Mo.

**Trade Report.**

**British Iron and Metal Markets.**

[Special Cable Dispatch to *The Iron Age*.]

LONDON, WEDNESDAY, June 17, 1885.

**Scotch Pig.**—The market is not so steady.

We quote makers' brands as follows:

|                             |      |
|-----------------------------|------|
| Cotness, alongside, Glasgow | 49/6 |
| Langloan,                   | 49/6 |
| Gartsherrie,                | 48/6 |
| Summerlee,                  | 48/6 |
| Carubroe,                   | 47/  |
| Glenegarock,                | 47/  |
| Eglinton,                   | 42/  |
| Dalmellington,              | 44/  |
| Shotts,                     | 49/  |
| at Leith                    | 49/  |

Lighterage from Ardrossan to Glasgow is 1/8 ton.

**Cleveland Pig.**—Is a little weaker. We continue quotations, f.o.b. shipping ports:

|                            |      |
|----------------------------|------|
| Middlesboro, No. 1 Foundry | 36 6 |
| " No. 2                    | 35/  |
| " No. 3                    | 32 6 |
| No. 4 Forge                | 32 6 |

**Bessemer Pig.**—Is irregular. W. C. Hemmities are quoted 43/ for mixed lots, Nos. 1, 2 and 3, equal portions, f.o.b. shipping ports.

**Manufactured Iron.**—The market is irregular. We quote at works:

|                         |                 |
|-------------------------|-----------------|
| Staff. Ord. Marked Bars | 7 10 0 @        |
| " Medium                | 6 0 0 @ 6 10 0  |
| " Common                | 5 10 0 @ 5 15 0 |

Hoops, 20 W. G. and over.

|               |                |
|---------------|----------------|
| " Common Best | 6 15 0 @       |
| " Medium      | 6 5 0 @ 6 10 0 |
| " Common      | 6 0 0 @ 6 7 6  |

Sheets, 20 W. G. and under.

|                 |                |
|-----------------|----------------|
| " Ordinary Best | 7 15 0 @ 8 5 0 |
| " Common        | 7 5 0 @ 7 15 0 |

Welsh Bars
 4 17 6 @ 5 2 6 |

**Steel Rails.**—Are not so steady. We quote £4. 15/ f.o.b. shipping ports.

**Old Rails.**—Are unchanged. We quote Old D. H.'s, c.i.f. New York, £3 @ £3. 2/6.

**Scrap.**—The market is unchanged. We quote Heavy Wrought £2. 10/ @ £2. 15/ c.i.f. New York.

**Copper.**—The market is a little weaker. We quote Best Selected, £48. 10/ @ £49. 10/ and Chili Bars, £44. 10/ @ £45.

**Tin.**—The market is firmer. Straits Tin, spot, is quoted £94 @ £94. 10/.

**Tin Plates.**—Are a little firmer. We quote:

|                                       |             |
|---------------------------------------|-------------|
| Tin Plates, 10x14, 1st qual. Charcoal | 19/6 @ 21/6 |
| " " 1st " " 18/6 @ 19/6               |             |
| " " 1st " Coke                        | 17/6 @ 18/6 |
| " " 2d " " 13/6 @ 14/6                |             |

**Spelter.**—The market is a little steadier. We quote Ordinary, at shipping ports, £13. 17/6 @ £14.

**Lead.**—The market is quiet. We quote Common English Pig, £10. 12/6 @ £10. 17/6.

**Freights.**—Steam from Glasgow to New York, 1/ @ 2/.

**Financial.**

Office of *The Iron Age*, WEDNESDAY EVENING, June 17, 1885.

There is disposition in some quarters to take a decidedly more cheerful view of business prospects, and not altogether without reason. There is undoubtedly a growing confidence in the stability of the currency—that the Treasury and banks in harmonious conjunction will successfully tide over any embarrassment arising from an excessive silver coinage, and that Congress will be prepared to act promptly and judiciously in setting all questions at rest. The present excellent condition of the cotton crop, which promises, perhaps, 1,500,000 bales in excess of last year's production, also conveys a gratifying assurance. But in the immediate future there are few cheering indications. The merchandise markets all through suffer from depression, and in the departments of industry labor disturbances are a source of uneasiness. Happily for workers in Iron, the conference at Pittsburgh apparently ends the formidable strike inaugurated a week ago, but does not bring manufacturers the relief hoped for from a temporary suspension of production. Another conspicuous fact is the continued depression and still lower prices current on the Produce Exchange, wheat, corn and oats all being a cent or two lower per bushel than a week ago. Provisions are very quiet, and export orders are slow. Large sales of flannels, bleached goods, &c., forced at auction, are chiefly satisfactory in the wide distribution effected, but these transactions are a considerable cost to the manufacturing interest. Cotton is a shade easier. Raw sugar in good demand and firm. Coffee dull and weak. Tobacco quiet. Hides are steady. Tea quiet. Freights are dull, the price of cereals being beyond the limit of exporters. Spirits of turpentine are higher.

The imports of merchandise at the port of New York during the last week are \$72,965 below those of the previous week, the total valuation being \$7,002,822, of which \$5,805,146 represents general merchandise and the remainder dry goods. The total since January 1 is \$174,513,563, as compared with \$207,252,199 for the corresponding period last year. The exports from this port for the week, exclusive of specie, were valued at \$6,040,368, which is a slight falling off compared with the previous week. The several items include 52,918 barrels flour, 343,203 bushels wheat, 541,090 bushels corn, 11,504 bales cotton, 7,851,206 gallons petroleum, 3,452,768 lb cut meats and 5,664,815 lb lard. According to the Custom House reports the imports of specie and bullion at this port during the week amounted to \$38,281, and the exports for the same time \$432,127, the latter mostly in American silver bars to London. The exports of precious metals thus far since January 1 amount to \$13,859,379, of which \$7,420,766 is silver.

The foreign commerce of the country at large affords a better exhibit than was anticipated.

The total receipts of merchandise at this port for the month of May were valued at \$28,818,447, which is nearly \$9,000,000

below the corresponding figures for last year, and \$15,000,000 below the total for May, 1882.

The total imports for 11 months, exclusive of specie, were \$346,319,225, as compared with \$410,000,880 last year. The imports of specie meanwhile were \$25,659,914. Turning now to the exports, it appears that the total value of shipments of produce

Shore bonds, and on Saturday Pacific Mail weakened under the decision of the Postmaster-General, refusing subsidies. On Monday the Grangers, Vanderbilts and Lackawanna were advanced another peg, but on Tuesday, the outstanding short contracts being adjusted, reaction was natural. To day there was a further decline in the entire list, prices closing as follows: Burlington and Quincy, 12/; Lackawanna, 10 1/2%; Delaware and Hudson, 7 3/4%; Lake Shore, 53 3/4%; Louisville and Nashville, 33 1/2%; Michigan Central, 40 1/2%; New York Central, 84 1/2%; New York and New England, 19 1/2%; Jersey Central, 37 1/2%; Northwestern, 92 1/2%; Northern Pacific, 16 1/2%; preferred, 38 1/2%; Oregon and Transcontinental, 13 1/2%; St. Paul, 68 1/2%; Omaha, 20 1/2%; Union Pacific, 52 1/2%; Western Union, 61 1/2%; Erie, 10; Memphis and Charleston, 36; Reading, 14 1/2%.

and merchandise was \$28,395,830, which is an increase of more than \$4,000,000 compared with May, 1884, despite the decline in imports. The total for 11 months, exclusive of \$21,517,606 in specie, is \$316,032,633, as against \$30,178,762 for the corresponding period last year. For the entire United States the first 10 months of the fiscal year gave a favorable balance of \$155,228,631, which may well increase—"a very large difference," as has been remarked, "when the decreased volume of trade is considered."

An inquiry into the result of investments in various securities during the last 10 years shows an extremely low rate of interest, even on first class bonds. As stated by a financial writer, "a minimum of income is the price paid for the maximum of safety, and the minimum gets lower and lower year by year." Another writer, while admitting the possibility of better prices for money before long, says the immediate state of things in Wall street hardly justifies a quotation for United States bonds higher than 2 or 2 1/2%, or debt-paying State and New York City bonds higher than 3%, or first-class bond and mortgage higher than 4 or 4 1/2%. All these together fail to supply the constantly-increasing demand for gold-plated investments.

The total exchanges of the Clearing Houses of the United States for the last week show a loss compared with 1884 of 18 9/10, and is unfavorable compared with the previous week. The principal falling off, however, is in New York City. The volume of trade has been very light, particularly at some of the Western centers. The manufacturing cities either show a gain in the percentage of clearings as compared with last year, or only a slight falling off. The business failures of the week number for the United States 1885, and for Canada 22, or a total of 207, as against a total of 223 last week, and 206 the previous week. There are 36 failures reported on the Pacific Coast, which is above the average. Other sections of the country show a decided decrease.

United States bonds closed as follows:

|                          | Bid     | Asked   |
|--------------------------|---------|---------|
| U. S. 3 per cent.        | 104 1/2 | 104 1/2 |
| U. S. 4%, 1881, coupon.  | 128 1/2 | 128 1/2 |
| U. S. 4%, 1897, coupon.  | 129 1/2 | 129 1/2 |
| U. S. Currency 6%, 1885. | 127 1/2 | —       |
| U. S. Currency 6%, 1896. | 129     | —       |
| U. S. Currency 6%, 1897. | 131     | —       |
| U. S. Currency 6%, 1898. | 133 1/2 | —       |
| U. S. Currency 6%, 1899. | 134 1/2 | —       |

The official announcement that the Union National Bank, one of our oldest institutions, had taken steps toward going into liquidation caused quite a surprise. The motive is explained by one of the resolutions passed by the board, which says: "The Board of Directors of the Union National Bank of the City of New York, after careful deliberation, taking into consideration the condition of business, the monetary situation, low rate of interest, high percentage of taxation, liability of loss and expense, have unanimously concurred in the opinion that a larger sum per share can be realized by placing the bank in voluntary liquidation than by continuing business." In pursuance with this resolve a meeting of the officers will be held July 15, and, as stated by President Male in a circular to the stockholders, should the vote be in favor of the liquidation, it is the expectation of the board to be able to return to the shareholders on or before September 1, 1885, the capital (\$1,200,000), and soon after to make distribution of the surplus—say, \$780,000 additional.

The Commercial National Bank will be opened July 1st with a capital of \$300,000, in the old Marine Bank Building, under the presidency of Orson Adams, lately vice-president of the Bank of the Republic. The Seaboard Bank has been admitted to the Clearing House Association of this city. The next convention of the American Bankers'

# Trade Report.

## New York Iron Market.

**American Pig.**—The week has been an exceedingly quiet one, the volume of transactions being very small. The market is dull and without any strength. While the leading companies maintain an attitude of unshaken firmness, there are always a number of anxious sellers. We quote standard brands of Lehigh and North River Irons, tidewater delivery, as follows: No. 1 X Foundry, \$17.75 @ \$18.50; No. 2 X Foundry, \$16.50 @ \$17.50; Gray Forge, \$15.25 @ \$16; the outside figure is asked for special brands. Outside brands sell for 50¢ @ \$1 less than our quotations.

**Scotch Pig.**—The trade in Scotch Pig drags along, being limited exclusively to retail lots. Nominal quotations for 5 and 10 ton lots are as follows: Coltness, \$21 to arrive; Gartsherrie, \$21 to arrive; Shotts, \$21 @ \$21.50 to arrive, \$22 from yard; Carnbroe and Glengarnock, \$19 @ \$19.50 to arrive; Summerlee, \$20 to arrive; Dalmellington, \$19 to arrive; Eglington, \$18 to arrive; Clyde, \$19 to arrive. Concessions are made for larger lots and for sales from dock.

**Bessemer Pig and Spiegeleisen.**—Buyers' and sellers' views are apart on Spiegeleisen on even the small business which is pending. Bids of \$24.50 are made, but \$25 @ \$25.50 is asked for 20%. We quote: Foreign Spiegeleisen, 20% remains nominally \$25 @ \$25.50, 10% \$21.50 @ \$21.75, 45% \$42, and 60% \$52.50. Foreign Bessemer is nominally \$19 @ \$19.25. American Bessemer Pig is dull and weak. We quote nominally \$15, \$16 and \$17 for Nos. 1, 2 and 3, respectively, at furnace.

**Bar Iron.**—There is no improvement whatever to report in the condition of this market. Some leading mills in Eastern Pennsylvania report that they are well supplied with orders. On the other hand, mills which have been leaders in establishing low prices do not appear to have their capacity provided for yet. We quote for delivery here, in round lots: Common Iron, 1.4¢ @ 1.55¢, Medium, 1.55¢ @ 1.65¢, and Refined Iron, 1.65¢ @ 1.9¢, the lower figures being occasionally shaded. Store prices are 1.6¢ @ 1.75¢ for Common, 1.75¢ @ 1.8¢ for Medium and 1.85¢ @ 2¢ for Refined. Swedish Iron is quoted \$70 a ton.

**Structural and Shaped Iron.**—During the week a number of contracts aggregating about 1000 tons of Beams have been placed, a part of the material contracted for being Foreign Beams. Messrs. Maxwell & Graves, Boreel Building, are sending out circulars for bids on the Brooklyn Atlantic Avenue Road, asking for estimates on structures which will carry 2000 and 2500 lb. per foot. The contract will probably be let in a week or 10 days. Nothing definite has yet been heard in regard to the large Australian bridge. There were 14 bidders, of whom four were American works—the Union, Phoenix, Edgemoor and the Dominion Works of Canada. While some small less responsible English concerns have been lower bidders, a chance still remains that an American may obtain the work. We are informed that investigation has shown that the American contractors, if they get the work, will be able to do as well in procuring the raw material in this country as in England, and that, so far as Eye-Bars are concerned, the cost per ton is only \$60 here, as compared with nearly \$120 in England. Angles may be quoted nominally 1.9¢ @ 2.1¢, delivered, for round lots, and Tees at 2.1¢ @ 2.25¢. Store quotations remain 2.2¢ @ 2.4¢ for Angles, and 2.5¢ for Tees. American Beams and Channels are 3¢ from dock for all orders. Foreign Beams in round lots, are quoted 2.5¢ @ 2.6¢ for Belgian, and 2.6¢ @ 2.8¢ for German.

**Plates.**—Business is quiet. Usual prices of Iron Plates are as follows: Common or Tank, 1.9 @ 2¢; Refined, 2.4¢ @ 2.5¢; Shell, 2.4¢ @ 2.5¢; Flange, 3¢ @ 3.5¢; Extra Flange, 4¢ @ 4.5¢. For small lots of Steel Plates the quotations are as follows: Ship, 3¢ on dock; Tank, 2.5¢ @ 2.8¢ on dock; Boiler, 2.5¢ @ 3¢ for Shell, 3.5¢ @ 4¢ for Flange, and 4¢ @ 5¢ for Extra Flange and Fire-Box. Round lots Open-Hearth Steel Bridge Plates, 2.5¢, cut to specification.

**Merchant Steel.**—The market is quiet and dull. Quotations for the range from ordinary to good grades are as follows: American Tool Steel, 7.5¢ @ 10¢; Tool Steel of special grades and finer qualities, 12¢ @ 20¢; Crucible Machinery, 4.5¢ @ 6¢; Spring and Tire, 2.5¢ @ 3¢; Open-Hearth Machinery, 2.5¢ @ 2.5¢; and Bessemer Machinery, 2.5¢ @ 2.5¢; English Tool, 13.5¢ @ 15.5¢.

**Steel Rails.**—With the exception of small lots of light and standard sections, nothing is being done. There are a few lots of moderate size in the market. Some of the railroads are showing a tendency toward asking for postponement of deliveries, which causes some embarrassment to some of the mills. We quote nominally \$27 @ \$27.50, noting that probably large lots could be placed at round concessions.

**Steel Wire Rods.**—Only a number of small spot lots, ranging between 100 and 500 tons each, have been placed at about \$3. Larger lots are still the subject of

negotiation between buyers and sellers, the latter hoping to do better than \$38.50. We quote \$39 @ \$39.50.

**Old Rails.**—A lot of Old Rails, estimated between 8000 and 10,000 tons, has been sold during the week by a Texas road, for delivery on the Delaware, at \$17.25, which is parity of about \$16.75 in this market. We hear of about 3000 tons additional at \$16.50. We quote \$16.75 @ \$17.

**Scrap.**—There have been no transactions of magnitude, and quotations remain nominally \$18 @ \$18.50 for No. 1 from yard.

**Rail Fastenings.**—The market is dull. Quotations for large lots are 2.6¢ @ 2.65¢ for Bolts and Square Nuts; 2.75¢ @ 3¢ for Bolts and Hexagon Nuts, and 1.6¢ @ 1.7¢ for Splice Bars. Railroad Spikes are quoted 1.8¢ @ 1.9¢.

### Philadelphia.

Office of *The Iron Age*, 220 South Fourth St., PHILADELPHIA, June 16, 1885.

**Pig Iron.**—The market remains in an unusually depressed condition, sales in quantity being practically impossible, unless by special arrangement between the parties. It cannot be said that prices are lower, but there is no market for anything except in a retail sort of way, and, as before stated, if sellers want to go beyond that, prices and terms have to be made in proportion. There are some holders to whom these remarks may not apply, but there are many to whom they do apply, and no fair report of the market can be made without referring to this phase of it. What the ultimate outcome will be is a problem which only time can solve. The outlook is not encouraging, and notwithstanding the rose-colored predictions of a New York daily, which assumed to speak for the Ironmasters of Eastern Pennsylvania, the demand has not improved nor is it likely to improve until after mid-summer, if it does then, which, while many hope for, but few expect. Prices are low enough truly, but the trouble is that there is so little consumption in proportion to the supply, and, while the supply would be increased on the first intimation of a demand, there is no prospect of increased consumption for some time to come, at all events. Buyers recognize this individually. They know that the demand for their goods is extremely light. They see that Pig Iron is cheap, and cannot possibly be much lower, come what may; but they have no use for Iron except in small quantities; therefore they are afraid to stock up. This appears to cover the whole ground, so there can be no change for the better until there is either an actual increase in consumption or a reasonable certainty that we are nearing the point when there will be an increase. Sales in the meantime have been in small lots at about \$15.50 for Gray Forge, \$16.50 for No. 2 and \$18 for No. 1 Foundry, delivered at tide. Large lots, as already stated, can only be placed subject to special arrangement. Southern Iron has been sold at \$14.25 for No. 3 Forge, Philadelphia, but there is very little demand for it, and, at the prices likely to be obtained, sellers are not urgent for business.

**Foreign Iron.**—Business is extremely quiet, no sales of any amount having been made for two or three weeks past. Some four or five weeks ago reference was made to an inquiry for 5000 tons 20% Speigel, with bid at \$24.50. It is understood that the contract has since been closed, supposed to be at about \$25, although \$25.50 was asked. Bessemer could be laid down at low figures, but there is no demand except for special brands, for which \$19 @ \$19.25 is asked. English Crops would be taken at \$18, but \$19 is asked. Welsh Crops offered at \$17.50 @ \$18.

**Muck Bars.**—Demand for small lots is fair, with sales at \$27 @ \$27.50, delivered, for best qualities; other descriptions offered at \$26 @ \$26.50, without leading to business.

**Blooms.**—Prices nominal, as there is scarcely anything doing. Asking rates as follows: Soft Basic Blooms, \$33.50 @ \$35; Billets, \$35 @ \$39, and Siemens-Martin \$40 @ \$42. Domestic Blooms, \$30.50 @ \$32, delivered, for Nail Plate, and \$35 @ \$36 for Plate and Sheet Blooms. Other descriptions dull and prices nominal, as follows: Charcoal Blooms at \$50 @ \$52; Run-out Anthracite, \$43 @ \$44; Scrap Blooms, \$34 @ \$35; Northern Ore Blooms, \$34.

**Bar Iron.**—There has been some little improvement in demand, but chiefly for small lots to cover immediate requirements. The mills are fairly well employed in one way or another, and are likely to remain so during the balance of the month. The outlook beyond that is somewhat uncertain, but there is an impression that the usual mid-summer suspension, following on the partial lockout in the West, will leave stocks at an extremely low point, and that the demand during the last half of the year will therefore be somewhat better than it has been during the first half. Prices are unchanged, and, as a rule, almost at the lowest on record. Sales of good Refined Iron at 1.05¢ @ 1.75¢, although 1.8¢ is the nominal rate for the best makes. Skelp Iron has sold to a moderate extent, so that, on the whole, the mills have rather more work on hand than they have had for some time.

**Plate and Tank Iron.**—Business has not been active in this department, small lots of Boiler Plate comprising the greater portion of the business. Large consumers are doing little or nothing at present, so that the indications are not favorable to immediate improvement. Prices as last quoted, viz.:

Ordinary Plate, 2¢; Tank, 2¢ @ 2.1¢; Shell, 2.5¢; Flange, 3.5¢; Fire-Box, 4.25¢; Steel Plates, Flange, 3.5¢ @ 3.75¢; Fire-Box, 4¢ @ 4.25¢.

**Structural Iron.**—There is more doing and more inquiry, with a fair probability of several good-sized orders being placed before the end of the month. No large lots are mentioned, but the aggregate amount of business offered is considerable for the times, and manufacturers feel somewhat encouraged by the improved outlook, especially for bridge work. Prices as last quoted, viz.: 2¢ @ 2.1¢, delivered, for Angles; 2.1¢ @ 2.15¢ for Bridge Plate; 2.3¢ @ 2.4¢ for Tees, and 3¢ for Beams and Channels.

**Sheet Iron.**—The demand is about an average for the season, but complaints in regard to prices are as numerous as ever. A great deal of inferior material is offered at low figures, but for standard qualities prices are about as follows:

|                                  |      |
|----------------------------------|------|
| Best Refined, Nos. 26, 27 and 28 | 31¢  |
| Best Refined, Nos. 18 to 25      | 33¢  |
| Common, 14¢ less than the above  | 5¢   |
| Best Bloom Sheets, Nos. 25 to 28 | 4¢   |
| Best Bloom Sheets, Nos. 22 to 25 | 4¢   |
| Best Bloom Sheets, Nos. 16 to 21 | 2.5¢ |
| Blue Annealed                    | 60¢  |
| Best Bloom, Galvanized, discount | 60¢  |
| Second quality, discount         | 60¢  |
| Common, discount                 | 60¢  |

fully realized, but to the ordinary observer the outlook is not brighter now than it was a week or a month ago. Here in Pittsburgh all branches of trade are extremely dull; since the stoppage of the Iron mills the number of idle men has been largely increased, many of whom neglected to put away anything for a rainy day, and these, of course, are in straitened circumstances. As a consequence, economy is the order of the day on the part of the working people, and all branches of trade are depressed thereby. Never before, perhaps, were there so many idle in this city, Allegheny and the adjoining boroughs. Rents have fallen materially; hence the outlook for building and building material is not near as good as it was a month or six weeks ago. A very discouraging feature connected therewith is that, notwithstanding the depressed condition of the real-estate market, depreciation in rents, &c., municipal taxes are as high as ever, with but little prospect of any immediate reduction. This, no doubt, is the situation in many of the leading cities throughout the nation, and bad municipal government has not been without its effect in bringing about and continuing the present depression.

**Wrought-Iron Pipe.**—There is no change to note under this head, the general position of the market being much the same as noted last week. There are few large orders being placed, but the demand for small lots is fair and sufficient to keep the market moving.

**Pig Iron.**—There is no change with the present condition of the market, and the outlook as regards the near future is by no means encouraging. All that is required to supply the few mills in operation is not a drop in the bucket, and notwithstanding there is no trouble among the founders, the demand for Foundry Iron is also exceedingly light; many of the foundrymen say they have little or nothing to do. Even if the strike was brought to a sudden close, it is doubtful whether some of the mills would be started, as they have no orders, and there is not much encouragement in the present condition of affairs to "pile up." Stocks are not large; mill yards, as a rule, are bare, but the consumption is also light; hence, notwithstanding stocks are comparatively light, they are largely excess of present wants. Prices continue weak and irregular, but without quotable change. We quote as follows:

|                     |         |
|---------------------|---------|
| No. 1 Gray Forge    | \$15.25 |
| No. 2 Gray Forge    | 14.50   |
| White and Mottled   | 13.50   |
| All-Ore Mill        | 15.75   |
| No. 1 Foundry       | 15.00   |
| No. 2 Foundry       | 15.00   |
| All-Ore Foundry     | 18.00   |
| Cast-Blast Charcoal | 25.00   |
| Bessemer Iron       | 17.50   |

**Nails.**—The market is quiet and unchanged. Nails are called for only in small quantities, and these in the aggregate do not make anything like a satisfactory demand. There is, however, no undue pressure to sell; hence prices are, as a rule, fairly well maintained at about \$2.25 per kg for retail lots, but on larger orders these figures are shaded according to size and quantity taken. Steel Nails move very slowly, and are quoted nominally at \$2.35 per kg.

**Steel Rails.**—There is not much doing, but prices show no material change. Small lots sell at about \$27.50 at mill, but orders for 1000-ton lots and upward could be placed at less money, providing deliveries were convenient to the sellers and terms of payment satisfactory. The mills are tolerably full for the present, but the outlook does not appear to be very encouraging.

**Old Rails.**—There is nothing doing of importance. A few small lots have been taken at \$17.75 @ \$18, Philadelphia, but lots to arrive could not be placed at over \$17 @ \$17.25. In fact, the demand is so uncertain that it is hard to say what price could be realized unless some one was actually wanting Rails. Deliveries in the interior are quoted \$18 @ \$18.50 asked, but buyers do not offer within 50¢ of those figures, and appear to be in control of the position at present.

**Scrap Iron.**—There is a fair demand, and prices are fairly maintained. The quotations given below are for Philadelphia deliveries—interior deliveries would bring about 50¢ per ton more—as follows: No. 1 Wrought Scrap, \$17 @ \$18; No. 2 do., \$12 @ \$13; Horse Shoes, \$22 @ \$23; Turnings, \$13 @ \$14; Old Car Wheels, \$15 @ \$16; Old Steel Rails, \$16 @ \$16.50; Fish Plates, \$22 @ \$23; Cast Scrap, \$13 @ \$14; do. Turnings, \$9 @ \$10.

### Pittsburgh.

[Special Dispatch to *The Iron Age*.]

PITTSBURGH, PA., June 17, 1885.

The result of the conference between the manufacturers and Amalgamated Association yesterday was in the nature of a compromise. After a session of eight hours the majority of the Pittsburgh members of the manufacturers' committee, the members from other sections withdrawing, agreed to sign the scale presented by the Amalgamated Association, with the exception of the Old-Rail clause and the Sheet-mill scale, these to be referred for settlement to committees composed of Sheet-rollers and manufacturers and workmen and manufacturers using Old Rails. The result is a victory for neither side. The Amalgamated consent to the signing of a mutilated scale—that is, with the Old-Rail clause and Sheet-mill scale in abeyance, which they have heretofore refused to permit, and the manufacturers have signed a scale without an acceptance of their demands on these two clauses. At present it is doubtful what the manufacturers outside of Pittsburgh will do. Most of the Pittsburgh mills will be in operation this week. The result was not reached without a good deal of friction, and is by no means acceptable to many manufacturers.

**Steel.**—No important change to note; demand continues light, while prices remain unchanged. Steel Nail Slabs, for which, of course, there is not the demand there was before the shut-down, are still quoted at \$20 @ \$30 per ton. Best brands Refined Cast Steel, 8.5¢; do. Crucible Machinery, 4.5¢ @ 4.7¢; Open Hearth and Bessemer, do. 3¢.

**Old Rails.**—There is little or no demand at present, and with few offerings the market is weaker, although we hear of no offers being made to sell under the prices quoted a week ago. One of the largest sellers in this market reports having had no inquiry for several weeks. We continue to quote Iron Rails at \$19, and Sheets at \$16.50 @ \$17.50, according to lengths.

**Steel Rails.**—Heavy Sections are still quoted at \$27 @ \$28, cash, on cars, at mill, according to character, delivery, &c.

**Railway Track Supplies.**—The demand continues light, while prices remain unchanged. Spikes, 1.0¢, 30 days, delivered; Splice Bars, 1.65¢ @ 1.75¢; Track Bolts, 2.65¢ @ 2.75¢ with Square and 2.8¢ @ 2.85¢ with Hexagon Nuts.

**Crop Ends.**—There have been no sales reported recently, in the absence of which we repeat former quotations. New Steel Rail Ends, \$18.50 @ \$19; Steel Bloom Ends, \$18 @ \$18.25.

**Scrap.**—There is little or nothing doing, and it is difficult to quote prices correctly in consequence. There was a time, years ago, when a strike was a harvest for the Scrap dealers, but since the finishers have all gone into the Amalgamated Association it is very different. There is no alternative now when there is a strike but to shut down. No. 1 Wrought Scrap is still quoted at \$17 @ \$18 per ton, outside figure for Selected; Old Car Wheels, \$16 @ \$17, gross ton.

**Coke.**—Market remains much the same as noted for some time past; Blast Furnace Coke is still quoted at \$1.20 per ton, free on cars at ovens.

### Chicago.

Office of *The Iron Age*, 36 and 38 Clark St., COR. Lake St., CHICAGO, June 15, 1885.

**Hardware.**—Jobbers report a very busy week. Country dealers are not placing large orders, but there appears to be a general demand for nearly everything in the line. Scythes, Snaths, Rakes and Steel goods of all kinds are most freely called for, but Builders' Hardware and Carpenters' Tools have had more than the average season call during the first half of this month. The fight on Cartridges during the week was much less aggressive than generally anticipated. The discount 60, 10, 10 and 2, as announced in the circulars of the Combination Cartridge Association, was promptly met by the Meacham Arms Company. The Simmons Hardware Company followed with a price list announcing 60, 10, 10 and 5, and created some anxiety as to what further reduction would be made by Hibbard, Spencer, Bartlett & Co. Whisperings among the trade made the announcement of 70 or 60 and three 10's probable, but in this all have been disappointed up to the present time, as no change from the net price list published in last week's *Iron Age* has been made. Prices on Locks and Padlocks have been advanced 5%, making present discount 66% off. The new prices issued for Flat-Head Screws had a tendency to stiffen the market and create a great deal of kicking. According to the circular, the Russell & Erwin Mfg. Co. had the privilege of canceling orders at 90% off, but this privilege has not proved very satisfactory to dealers, as numerous orders were canceled when the advance occurred.

**Muck Bar.**—Nothing doing, and in the absence of sales we omit quotations. **Manufactured Iron.**—The general position of the market remains unchanged. Even if the strike was brought to a close within the next 24 hours, it is doubtful about



# Trade Report.

## General Hardware.

The features in the market that call for review are noted below, but the general situation remains practically unchanged since last week. The volume of trade continues moderate, most of the orders being for small assorted lots to meet present demand.

### NAILS.

The market has been quiet, with very few large transactions on dock and a moderate business from store. We quote Iron Nails from store \$2.10 @ \$2.15, with the usual advance for Steel Nails.

In response to numerous inquiries we have compiled the following list of works in the East who make Steel Nails. It should be stated, however, that nearly all of them are at the same time producers of Iron Nails:

Pottstown Iron Company, Pottstown, Pa. Charles L. Bailey & Co., Harrisburg, Pa. Ellis & Lessig Steel and Iron Company, Limited, Pottstown, Pa.

Albany and Rensselaer Iron and Steel Company, Troy, N. Y.

Harrisburg Nail Works, Harrisburg, Pa.

Williamsport Iron and Nail Works, Williamsport, Pa.

The Danville Nail Mfg. Co., of Danville, Pa., have thus far made only a very few Steel Nails. At a meeting of the directors of the company it was resolved to submit to the stockholders, at a meeting to be held on the 10th of August, a proposition to increase the capital stock of the company by \$100,000. The company now have the drawings and estimates for a steel plant which it is proposed to erect during the summer.

The Weymouth Iron Company, of East Weymouth, Mass., make Steel Nails from Scrap Steel selected from their stock.

The following works report that they make Iron Nails exclusively:

Duncannon Iron Co., Philadelphia, Pa. Fall River Iron Works, Fall River, Mass.

James Rowland & Co., Philadelphia, Pa. Old Colony Iron Co., Taunton, Mass.

R. A. Bostley & Co., Towanda, Pa. Reading Iron Works, Philadelphia, Pa. Lewisburg Nail Works, Lewisburg, Pa. Hollidaysburg Iron & Nail Co., Hollidaysburg, Pa.

### BARE WIRE.

The market continues dull and shows indications of weakness. We quote 4.4 to 4.5 cents for carload lots of Four-Pound Galvanized Barb Wire, and 4 1/2 to 4 1/4 cents for small lots. Large lines for export are quoted 4 cents, the lower price being due to the fact that a drawback of 90 per cent. is allowed on the duty on imported Wire Rods.

Messrs. Washburn & Moen Mfg. Co. and I. L. Elwood & Co. have, under date of June 15, issued the following circular to dealers in and consumers of Barb Wire:

We have had occasion within the past two years to issue various circulars in regard to our Barb-Wire litigation, and have taken great pains to inform dealers in and consumers of Barb Wire of our rights, and have even gone so far as to personally interview very many dealers throughout the West in regard to the damage they incurred in handling Barb Wire not manufactured under a license from us. Our efforts have been attended with a great measure of success, but some dealers professed no faith in our ability to sustain the Glidden patent, which has been in litigation for some time. For the satisfaction of those who placed reliance on our statements, and for the benefit of those who did not, we beg to submit certified copies of two decrees entered by Judge Brewer, of the United States Circuit Court for the Southern District of Iowa, under date of June 10—one against an unlicensed manufacturer, and the other against a dealer in unlicensed Wire. In these decrees it will be observed that the validity of the Glidden patent is declared, and also the infringement by these parties. The manufacturer is placed under heavy bonds pending the accounting of damages, and the dealer is summarily enjoined. We submit these decrees without further comment as the strongest vindication possible of our rights.

The following is the text of the decisions referred to, rendered by David J. Brewer, Judge of the Circuit Court of the United States, Southern District of Iowa, Central Division:

WASHBURN & MOEN MFG. CO. AND ISAAC L. ELLWOOD VS. J. B. HODGES AND J. E. ANDREWS.

This cause having come on to be heard on the bill of complaint, answer, replication, and the proofs taken in said cause, and having been argued by the counsel for the respective parties, and the court having duly considered the same, it is therefore ordered, adjudged and decreed by the court:

1. That the following letters patent of the United States, to wit: Letters Patent No. 157,124, granted to Joseph F. Glidden November 24th, 1874, for an improvement in Barb Wire, is a good and valid patent.

That said Joseph F. Glidden was the first and original inventor of the improvements and inventions described and claimed in said Letters Patent No. 157,124, and that the complainants became and are vested with the exclusive right, title and interest in and to said letters patent, as in said bill of complaint.

2. That said defendants, J. B. Hodges and J. E. Andrews, have infringed said Letters Patent No. 157,124, granted to said Joseph F. Glidden, by making and selling Barb Wire embodying the improve-

ments claimed in said letters patent, and that said defendants have violated and infringed upon the exclusive rights of the complainants secured to them by said letters patent in the manner set forth and described in the pleadings and proofs in this cause.

3. That said complainants are entitled to a discovery and accounting from said defendants of the gains and profits had and received by the defendants, and that the complainants recover the gains, profits and advantages which the said defendants have received, or which have accrued to the defendants for said infringement of said Letters Patent No. 157,124 by the manufacturer, use or sale of the improvements described, and secured by said letters patent since the 24th day of November, 1874, and such further damage as the said complainants may have sustained by reason of such infringement.

4. That it be referred to P. T. Lomax, a master of this court, to take and report to the court an account of the gains, profits and advantages which the said defendants have received or which have accrued to the defendants since the 24th day of November, 1874, by infringing the said exclusive rights secured to the complainants by virtue of said Letters Patent No. 157,124, and also what additional damages the complainants have sustained by reason of such infringement. And said master is directed to take proofs and report the same, with his conclusions thereon; and he is hereby authorized to summon the defendants, their agents and employees before him, and to examine them on oath, and to require the defendants to produce their books of account touching the matters hereby referred; and the proofs already taken or used in this cause may be used on said reference, and such other testimony may be taken for use before the master as is authorized by law and by the rules of this court, as either party may desire.

5. It is hereby ordered, adjudged and decreed that said defendants, J. B. Hodges and J. E. Andrews, their successors or assigns, agents, attorneys and employees, be and they hereby are perpetually restrained and enjoined from making, using, selling or vending any Barb Wire Fence or Barb Fence Wire containing any of the said inventions described and claimed in said Letters Patent No. 157,124, during the life of said letters patent, and that an injunction issue accordingly. (Signed)

DAVID J. BREWER, Circuit Judge.

The second decision in the case of Washburn & Moen Mfg. Co. and Isaac L. Ellwood vs. Grinnell Wire Company, Walter Rhodes and J. E. Rhodes is identical, so far as the four first counts are concerned, with the names of defendants being changed. Its conclusion, in which it differs from the first decision quoted, is as follows:

5. It is hereby ordered, adjudged and decreed that said defendants, Grinnell Wire Company, Walter Rhodes and J. E. Rhodes, their successors or assigns, agents, attorneys and employees, be and they hereby are perpetually restrained and enjoined from making, using, selling or vending any Barb Wire Fence or Barb Fence Wire containing any of the said inventions described and claimed in said Letters Patent No. 157,124, during the life of said letters patent, unless the said defendant, the Grinnell Wire Company, shall, within 20 days from the date of entering up this interlocutory decree, file, in the clerk's office of this court, a true and correct account, under oath, of the number of pounds of Barb Wire which they have manufactured and sold, of the style of Wire introduced in evidence in this cause, since the 13th day of May, 1885, up to this date, and shall thereafter, on or before the 10th day of each calendar month, and until the entering of the final decree in this cause, file, in said clerk's office, a true account, under oath, of the number of pounds of Barb Wire which they have manufactured and sold during the month preceding, and shall also pay into court, upon the filing of said accounts, and each of them, a sum of money equal to 15 cents for each and every 100 pounds of Barb Wire shown to be manufactured and sold by such reports; and unless, further, the said defendants shall, within said 20 days, file a bond in the penal sum of \$50,000, with at least two good and sufficient sureties, to be approved by the court, upon the entry of the final decree in this cause, such sum as shall be found by the court to be due from the defendants, or either of them, to the complainants.

And it is also further ordered that, upon the entry of the final decree, the said defendants, and each of them, be and they are hereby restrained and enjoined from increasing the number of Barb Wire machines in their factory or elsewhere operated by them, or either of them, and from enlarging the manufacture of Wire above the amount heretofore manufactured.

And the court reserves to itself the right to modify the terms of this decree at any time before the entry of the final decree, and to make the injunction absolute, if it shall appear that justice so requires.

(Signed) DAVID J. BREWER,

Circuit Judge.

Same decree entered in the case of Washburn & Moen Mfg. Co. and Isaac L. Ellwood vs. Farmers' Protective Association and William L. Carpenter.

The Grinnell Wire Company, of Grinnell, Iowa, have issued the following circular, under date of June 11:

Yesterday Judge Brewer entered an interlocutory decree in the Glidden Wire patent case, allowing us to continue the manufacture of Barb Wire, the same as heretofore; also allowing us to deposit a bond of \$50,000 to cover any judgment that may be rendered on final decree, and requiring us to deposit a royalty of 15 cents per 100 pounds on all Wire manufactured after May 13, 1885. The case will now go to the Supreme Court for final determination. This order protects us fully from any liability whatever for past damages, and places your Wire for the future on the same basis as any other licensed Wire. Washburn & Moen cannot collect a cent from you. We will now fill

your orders promptly, and wish to return many thanks for your patience and confidence in the past, and trust that we shall be favored with your patronage in the future.

### LOCKS.

The Lock Association, which was in session when we went to press last week, advanced the quotation on Locks 5 per cent., making the price discount 66 2/3 and 2 per cent. for cash.

Referring to this change the Nimick & Brittan Mfg. Co., Pittsburgh, Pa., issue the following Discount Sheet No. 6, which bears date June 10, there being, it will be understood, the additional cash discount of 2 per cent.:

Dis. per cent.  
Door Locks, Knobs, Latches, Keys, Escutcheons and Bell Pulls..... 66 2/3  
Padlocks and Padlock Keys..... 66 2/3  
Butts, Genuine Bronze..... 50  
Butts, Egyptian Bronze..... 75  
Butts, Bronze Plated..... 70  
Lever Bell Pulls..... 50  
Sash Locks..... 50  
Sash Door Handles, Locks and Latches..... 50  
Miscellaneous Genuine Bronze Goods..... 50  
Miscellaneous Egyptian Bronze and Brass Plated Goods..... 50

Scales..... 50

It is also announced that on all purchases of Locks, Knobs, Latches, Keys, Escutcheons and Bell Pulls amounting to \$500 net during season ending December 31, 1885, a special quantity discount of 5 per cent. will be allowed, and that on all purchases of 50 dozen Padlocks at one time a special discount of 5 per cent. will also be given. The circular also contains the following revised list of Door Locks and Latches.

Door Locks and Latches.  
Nos. 31 32 34 36 221 222  
Per doz. \$2.95 3.00 3.90 3.90 5.15 5.85

Nos. 226 401 401 402 406

Per doz. \$8.85 4.35 5.15 6.35 6.35

Nos. 0701 0721 01001 01051 01052

Per doz. \$2.95 3.00 1.00 3.90 5.15 5.85

Nos. 1050 01063 1067 01072 1076

Per doz. \$8.85 9.75 9.75 10.75 10.75

Nos. 103 1057 22X 22G 22C

Per doz. \$11.70 11.70 10.00 10.60 18.70

Door Knobs.

Nos. 100 101 110 111

Per doz. \$2.55 2.55 3.15 3.15

Some of the other manufacturers have also sent out circulars announcing the new discounts on Locks, Knobs, &c.

### SCREWS.

There has been no change in the general aspect of the market since our last report, quotations remaining as before, with a moderate trade. There is still, our readers will understand, considerable divergence in the prices of the different makers, and this, with the two lists now in use, causes some irregularity and uncertainty. But, while prices thus remain as at our last writing, it will interest the trade to learn that the Russell & Erwin Mfg. Co. have bought out the Syracuse Screw Works, Syracuse, N. Y., purchasing all their machinery, tools, &c., used in the manufacture of Screws, Tire Bolts and Stove Bolts. The Screw machinery will be removed by the Russell & Erwin Mfg. Co. to Dayton, Ohio, where it will be added to the plant of the Dayton Screw Company, and the Bolt machinery to the factory at New Britain, Conn.

### AMMUNITION.

The recent reduction in the price of Ammunition is attracting much attention with the trade, and dealers in this line are sending out announcements and circulars in regard to the new prices and the present condition of the market. The following, bearing date June 6, has been issued by Edw. K. Tryon, Jr., & Co., Philadelphia, and will be of interest to our readers as giving the new discounts on some lines which were not specified in the association circular which we printed last week:

Discount from Company's List Prices.

Gun Fire Cartridges..... 60 & 10

Central Fire Pistol Cartridges..... 40 & 10

Central Fire Sporting and Military Cartridges, 22 Caliber, per 1000, net..... 31 & 10

Blank Cartridges, 32 Caliber, per 1000, net..... 3.00

Blank Cartridges, other sizes, 10 per cent. less than Ball Cartridges.....

Paper Shells, first and second quality..... 25 & 5

Paper Shells, Rival and XX quality..... 45 & 5

Primed Shells and Bullets..... 25 & 10

Felt Wads, all qualities..... 20

Card-Board Wads..... 30

Berdan, Wesson & Winchester Brass Shells..... 60 & 10

Keystone Brass Shells..... 60 & 10

Sturtevant Brass Shells..... 60 & 10

Bailey Brass Shells, Rival and XX quality..... 60 & 10

Saloon Caps, per 1000, net, per doz. net..... 1.60

Winchester Primers, all sizes, per 1000, net..... 1.00

Wesson Primers, all sizes, per 1000, net..... 1.00

Berdan Primers, all sizes, per 1000, net..... 25

Sturtevant Primers or B. L. Caps, per 1000, net..... 85

It is then stated that an extra discount will be given on all Ammunition ordered in case lots, with special prices for large orders. These prices given above are stated to be subject to change without notice, and orders will be filled at prices ruling at the time of their reception. The intimation also is given that the house issuing the circular proposes to meet competition.

Joseph C. Grubb & Co., Philadelphia, also issue a postal card in which they say that, owing to the break in prices on American Ammunition, Metallic Cartridges, Paper and Brass Shells, &c., they desire to advise their friends that they will guarantee them the lowest market prices, subject to change without notice.

The following discount sheet has been issued by the

SANDUSKY TOOL COMPANY,

as applying to their catalogue of 1885, to which we referred last week. It will be of interest as showing the line of goods represented, and the prices at which they are regularly quoted. The discounts given are subject to an additional 2 per cent. for cash in 10 days:

Dis. per cent.

Bench Planes, 2d grade, stamped Odonts Tool Company..... 25

Fancy Planes, all kinds..... 40

Plane Irons, all kinds..... 20

Solid Steel Planer's Hoes..... 50 & 10

Steel Steel Scovil Pattern Hoes..... 50 & 10

Brad Awls and Tools..... 60 & 10

Gauges..... 35

Saw Handles..... 20

Plane Handles..... 20

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June 18, 1885.

## THE IRON AGE.

27

Boring Machines..... 45

Merrill &amp; Wilder's Socket Firmer Chisel Sets, No. 10, in Fancy Boxes..... 25

Socket Firmer Chisels, No. 10..... 60&amp;10

Socket Firmer Chisels, No. 5..... 70

Coach Makers' Chisels..... 25

Paring and Millwrights' Chisels..... 25

Carpenters' Sicks..... 25

Socket Framing Chisels, Nos. 10 and 20..... 60&amp;10

Socket Framing Chisels, No. 5..... 60&amp;10

Cone Chisels..... 25

Socket Firmer Gauges..... 25

Drawing Knives..... 25

Drawing Knives, stamped Hinsdale Mfg. Co. 70

Robinson's Drawing Shaves..... 25

Watrous' Adjustable Drawing Knives..... 15

Davis's Inclinometers..... 10

Davis's Level and Level Glasses..... 20

Davis's Pocket Levels..... 10

Davis's Hack Saws..... 20&amp;10

Davis's Saw Blades..... 20

Davis's Screw Drivers..... 20

Davis's Screw Drivers..... 20

Davis's Calipers..... 20

Davis's Center Squares and Awls..... 20

Davis's Gauges, Planer Jacks and Planes..... 20

Breast Drills and Rules..... 20

Chucks..... 40

Miter Boxes..... 20

Hand Drills..... 20

Hartwell's Bits, all sizes..... \$6.50 gross, net

Other Goods..... 20

Shepardson's Chisel..... 25

Hartwell's Gimlets..... \$6.50 gross, net

Shepardson's Small Tools..... 25

Shepardson's Bits and Countersinks..... 25

Shepardson's Screw Drivers..... 25

Clark Tool Company's Screw Drivers..... 25

"Telescope" Screw Drivers..... 25

Clark's Screw Driver Sets..... 25

Double Cut Bits..... 25

Co. J. C. Co.'s German Pattern Bits..... 40

Clark's German Pattern Bits..... 40

Center Bits..... 10

Other Bits..... 40

Pod and Countersink Bits..... 40

Screw and No Screw Gimlet Bits..... 30

Screw Driver Bits..... 50

Nail Sets and Reamers..... 35

Clark Tool Company's Countersinks..... 10

Clark Tool Company's Countersinks and Calipers..... 10

Clark Tool Company's Calipers..... 10

Nail Sets and Reamers..... 35

Eureka Nail Gimlets..... 40

Wood Head Nail Gimlets..... 40

C. E. J. &amp; Co.'s "Star" Gimlets..... 40

Clark's Pod Gimlets..... 40

Clark's Double Cut Gimlets..... 40

Barber's Countersinks..... 10

Clark Tool Company's Compasses, Dividers and Calipers..... 10

Clark Tool Company's Scales..... 10

Sewing Machines..... 10

Spring and Revolving Punches..... 50

Fluting Scissors and Pinching Irons..... 20

Pinking Irons..... 50&amp;5

Gas Pliers..... 50&amp;10

Box Chisels..... 20

Cigar Box Openers..... 25

Cold Chisels..... 15

Plumbers' Scrapers..... 40

Oyster Knives, New York Pattern..... 35&amp;5

Oyster Knives, Boston and California Pattern..... 35&amp;5

Rivet Sets..... 10

Saw Sets..... 30&amp;5&amp;5

Saw Sets Hammer..... 50

Keller Saw Sets..... 35&amp;5

Wardrobe Hooks..... 35&amp;5

Soket and Scratch Awls..... 25&amp;10

Clark Tool Company's Brad Awl Blades..... 20

Handle Brad, Scratches and Belt Awls..... 25

Cotton and Box Scratches..... 35&amp;5

Box Scraps, No. 5..... 35&amp;5

Box Scraps, other Nos..... 40

Washer Cutters..... 25

Weston's Pattern Bench Hooks..... 35&amp;5

Clark Tool Company's Spoke Trimmers..... 35&amp;5

Spoke Shaves..... 20

Brick and Pointing Trowels..... 30

Saw Files..... 35&amp;5

Barbers' Scissors..... 35&amp;5

Smith's Shingling and Claw Hatchets..... 40

Howard &amp; Co.'s Hatchets..... 40

Clark Tool Company's Hatchets..... 50

Handled Axes..... 50

Carpenters' Nail Hammer..... 35&amp;5

Upholsterers' Hammers..... 25

Tack Hammer..... 30

Diagonal Wrenches..... 35&amp;5

Hartwell's Pocket Wrenches..... 35&amp;5

Remington's Socket Wrenches..... 35&amp;5

Steely's Adjustable Planes..... 30

Sleeky's Planes..... 30

Popping's Planes..... 30

Smith's Mincing Knives..... 30

Clark's Patent Steakgrieths..... 30

Tack Claws, Cake Turners and Kitchen Forks..... 35&amp;5

Lemon Squeezers..... 40

Carpet Stretchers..... 35&amp;5

Ice Chisels..... 40

Ice Cutters..... 35

Clark Tool Company's Ice Tongs..... 35&amp;5

Picks and Breakers..... 40

Patent Cork Screws..... 30

Ordinary Cork Screws..... 35&amp;5

Carpet Whips..... 35&amp;5

Clark Tool Company's Car Opener, Nos. 10 and 15..... 70

Car Opener, other numbers..... 50

Cardine Scissors..... 35&amp;5

L'Hommedeu Cutlery..... 35&amp;5

New England Cutlery..... 45

Carvers and Bread Knives..... 35&amp;5

Britannia Tea and Table Spoons..... 60

American Cast Steel Shears and Scissors..... 50

Maroon..... 60&amp;5

American Cast Steel Shears and Scissors, Plated..... 50

Etina Cast Steel Shears and Scissors, Maroon..... 75&amp;10

Etina Cast Steel Shears and Scissors, Plated..... 65

American Cast Iron Shears and Scissors, 75

American Cast Iron Shears and Scissors, Plated..... 10

Griffin's Butcher Saws, Nos. 30 and 35..... 40

Griffin's Butcher Saws, No. 50..... 40

Clark's Butcher Saws..... 35&amp;5

Clark's Meat Saws..... 35&amp;5

Clark's Saw Knives..... 35&amp;5

Clark's Key Hole Saws and Blades..... 35&amp;5

Clark's Companion Saws..... 35&amp;5

Griffin's Butcher's Saws..... 35

Clark's Farmer's Saw Blades..... 35

Clark's Farmer's Hand Saw..... 35

Clark's Combination Saws..... 25

Clark's Pruning Saws..... 25

Blacksmith's Bellows..... 50

Hand and Molders' Bellows..... 40

Belt Hooks..... 75

Spring Cotters..... 50&amp;10

Roller Skate Cotters..... 50&amp;10

Saw Cotters..... 40

Chisel Handles..... 50&amp;10

File Handles..... 50&amp;10

Brad Awl Handles..... 50&amp;10

Screw Driver Handles..... 50&amp;10

Bench Screws..... 45

Hand Screws..... 45

Jack Screws..... 50

Jail Locks, Locks, Shackles..... 50&amp;10

Padlocks, Fast Shakes..... 50&amp;10

Giant Hollow Handles..... 50

Boy's Bit Brace and Tools..... 35&amp;5

Tool Chests..... 40

RUSSELL, BURDSALL &amp; WARD,

Port Chester, N. Y., have issued a new cata-

logue and price list of their Bolts, which will

be appreciated by their customers and the

trade at large. Their aim in preparing it is

thus stated:

With the view of illustrating the styles of

Bolts now most popular with the largest

consumers, and in order to convey a clear

idea to our customers of the varieties we

are best prepared to supply them with, and

also to afford them medium suggestive of

what may meet their requirements, we have

carefully prepared this catalogue, and illus-

trated it with carefully proportioned cuts

made of some of our leading standard

varieties of Bolts, from which they can select

and order without apprehension of mistake by

simply referring to the page and number of

Bolt thereon.

The illustrations are very satisfactory, but

those using the list will especially appreciate

the delightfully large and clear type in which the list prices are printed.

## ITEMS.

A. Alford, the president of the Alford & Berkele Company, 77 Chambers street, New York, has compiled an illustrated pocket catalogue of the Cutlery of the Goodell Company, for which they are agents, with comparative list of prices and numbers, which shows at a glance the corresponding numbers of the other manufacturers with the list price. This comparative table is not intended to be exhaustive, but comprises the leading numbers, and will be of service to those who desire to know the numbers of the Goodell or other goods which they may desire to substitute for the make with which they are most familiar. The list of the Goodell Company, which is given, is that to which we have already directed the attention of the trade, and is fully illustrated, showing the variety of patterns of which they are the manufacturers. The book comes to us in very attractive form. It should be borne in mind, however, that it is not printed for general distribution, but exclusively for the buyers of wholesale hardware and cutlery houses, by whom it will be appreciated.

Dame, Stoddard & Kendall, Boston, in their announcement on page 36, call attention to Forbes's Patent Acme Curb Skate as the original and only genuine Acme Ice Skate, which is manufactured by the Star Mfg. Co., Halifax, for which they are the sole selling agents for the United States.

Announcement is made May 26 by Chas. J. E. Thompson,



**NIMICK & BRITTAN MFG. CO.,**  
PITTSBURGH, PA.,  
**BUILDERS' FINE HARDWARE,**  
RIM AND MORTISE DOOR LOCKS WITH  
BURGLAR-PROOF ATTACHMENT.  
GENUINE BRONZE AND IMITATION BRONZE KNOBS, &c., &c.  
Mathes' Patent Burgular-Proof Sash Locks.

**PADLOCKS.**

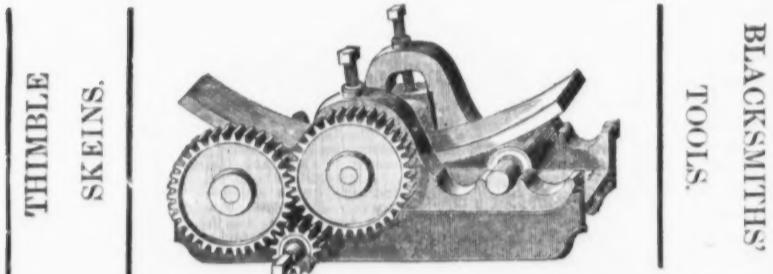
TEA, COUNTER, UNION AND PLATFORM SCALES.  
Catalogues and Lists furnished on application.  
JOHN H. GRAHAM & CO., Agents, 113 Chambers St., New York.

**ILLINOIS IRON & BOLT CO.,**

Nos. 20 to 26 Main Street,

CARPENTERSVILLE, KANE CO., ILL.

MANUFACTURERS OF



**TIRE BENDER No. 3.**

JACK SCREWS, SADIRONS,

COPYING PRESSES AND STANDS, &c.

**WHITE MOUNTAIN FREEZER CO.,**

MANUFACTURERS OF

Sands' Patent Triple Motion

**WHITE MOUNTAIN ICE CREAM FREEZER.**



WHITE MOUNTAIN FREEZER CO.,  
101 E. Hollis St., Nashua, N. H.

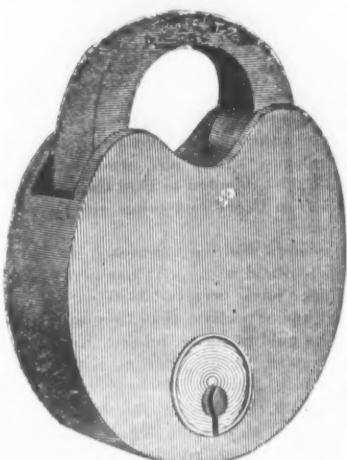
**CRESCENT LEMON SQUEEZER**



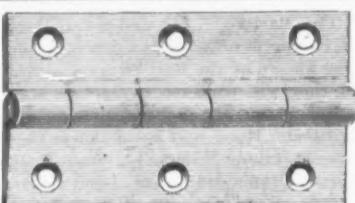
The Best Finished Goods in the Market. Warranted Malleable Iron. Fine X. C. Plate.  
PRICE \$2.00 PER DOZ., NET.

GEO. B. CURTISS 95 CHAMBERS ST., N. Y.

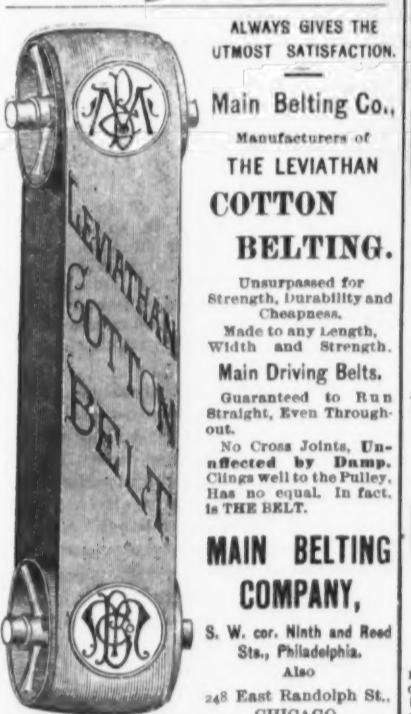
**A. E. DEITZ.**



**DURRIE & McCARTY, Agents,**  
97 Chambers & 81 Reade Sts., New York.



**W. & J. TIEBOUT.**  
MANUFACTURERS OF  
BRASS, GALVANIZED & SHIP CHANDLERY  
**HARDWARE.**  
Nos. 16 & 18 Chambers Street,  
NEW YORK.



**Wiley & Russell Mfg. Co.**

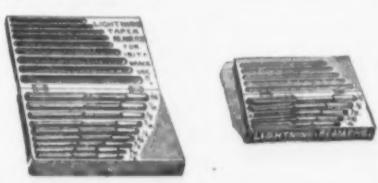
Greenfield, Mass.

**LIGHTNING . . . REAMERS**

For Use in the Bit Brace.

They are made of best English Steel and finished in the best manner, being ground true to size after hardening.

These Tools are put up in cases of different assortments, one holding tools from  $\frac{1}{4}$  to  $\frac{1}{2}$  (5 sizes) and one from  $\frac{1}{4}$  to  $\frac{1}{4}$  (9 sizes), as shown below.



SEND FOR NEW PRICE LIST.

**De LOACH WATER WHEELS,**

PORTABLE MILLS AND  
MILL STONES.

Simplest and

Cheapest

in the Market.

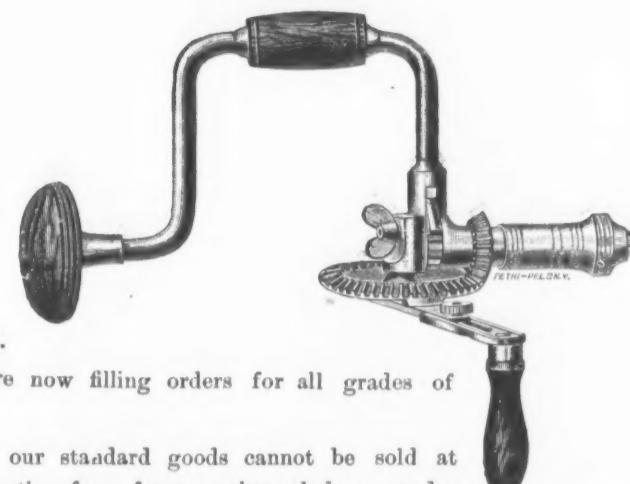
Send for large Illustrated Catalogue and be sure to get our prices before buying.

A. A. De LOACH & BRO. Manufacturers, Atlanta, Ga.

FOR ILLUSTRATED CATALOGUE ON  
**SHELF BOXES**

Send to JESSE JONES & CO., 615 Commerce St., Phila., Pa.

**BARBER'S BIT BRACES.**



We are now filling orders for all grades of  
Braces.

While our standard goods cannot be sold at  
much reduction from former prices, the new grades  
will be offered at market rates for goods of like quality. Our Braces  
are still covered by six good and valid patents, which have several  
years to run. Quotations on our full line will be furnished on request.

**MILLERS FALLS CO.,**

No. 74 CHAMBERS ST., NEW YORK.



**THE SEIDEL & HASTINGS CO.,**  
WILMINGTON, DELAWARE,  
New York Office, No. 221 Pearl, Corner Platt Street,  
MANUFACTURERS OF  
**BEST CHARCOAL  
BOILER PLATES,**  
AND PLATE IRON GENERALLY.  
ALSO BEST QUALITY HOMOGENEOUS STEEL PLATES.

We ask the special attention of the trade to our C. H. No. 1 Boiler Plates, which we  
manufacture expressly for the Shells of Steam Boilers and tanks 50,000 pounds T. S. when  
detected. One hundred and sixteen tests of this have been made during the last three years by the  
U. S. Inspectors of Steam Vessels, show an average tensile strength of 58,808  
pounds to the sectional square inch, and an average reduction of area of the fractured  
section of 30% per centum. Our prices are as low as the production of a good article will admit of.



**ALFRED C. REX & CO.**

Manufacturers of  
BRANCH OFFICES:  
126 Chambers St., New York, Chas. E. Spier, Mgr.  
and 415 Commerce St., Phila.

New Spring Specialties—King Egg Beaters, awarded medal at American Institute, New

York; King Candle Lamp and Lantern, cheapest combination ever made.

**STRONGEST ACME WRENCH AND BEST.**



ALL STEEL CASE-HARDENED JAWS, WARRANTED. MANUFACTURED BY  
OUSLEY BROS. & MARBLE, 784 to 794 Madison St., CHICAGO, U. S. A.  
NEW YORK WAREHOUSE, CHAS. X. CORDIER, AGT.,  
101 Chambers St. and 166 Church St.

**PURE TURKISH EMERY.**

**WALPOLE EMERY MILLS,**  
South Walpole, Mass.

# THE IRON AGE BOOK DEPARTMENT.

## IRON, STEEL AND METALURGY.

*Greenwood.—Steel and Iron.* Comprising the practice and theory of the several methods pursued in their Manufacture, and of their treatment in the Rolling Mill, the Forge and the Foundry. By W. H. Greenwood; 97 illustrations, 536 pages, 12mo, cloth. . . . . \$2

This work satisfactorily presents in convenient form the most important processes employed in the manufacture of iron and steel. The illustrations are in most cases reduced from actual working drawings. The style is simple and clear. Although many of the recent improvements in American practice have not received the thorough attention which they merit, the book treating more particularly of English practice, the author has succeeded in producing a comprehensive manual for the technical student, and an intelligible and valuable assistant to the practical iron-worker. The chapter headings are as follows:

Explanation of Terms; Refractory Materials, Crucibles, &c.; The Ores of Iron; Metallurgical Chemistry of Iron; Cast or Pig Iron; The Production of Pig Iron; The Blast Furnace; Hot-Blast Stoves, Hoists, Lifts, &c.; Fuel, Blast, Charges, Yield and Waste Gases of the Blast Furnace; Casting in Iron, Foundry Appliances, &c.; Malleable or Wrought Iron; The Production of Malleable Iron Direct from the Ore; Indirect Methods for the Production of Malleable Iron; The Production of Malleable Iron in Open-Hearth Furnaces; Refining of Pig Iron; Puddling; Mechanical Puddling and Rotatory Puddling Furnaces; Forge and Mill Machinery, Furnaces, Plant, and Operations; Steel and Ingots Iron; The Methods Employed in the Production of Steel Direct from the Iron Ore and by the Carburization of Malleable or Bar Iron, by the Decarburization of Pig Iron in the Finery or in the Puddling Furnace, by the Fusion of Pig Iron with Malleable Iron or with Iron Ores in the Open-Hearth Steel-Melting Furnace; The Bessemer or Pneumatic Process for the Production of Steel from Pig Iron; The Basic Process for the Conversion of Phosphoric Pig Iron into Steel in the Bessemer Converter; The Production of Homogeneous Steel Ingots, Fluid Compression of Steel, Compound Armor Plates, &c.

*Thurston.—Materials of Engineering.* By Robert H. Thurston, C. E., Professor of Engineering, Stevens Institute of Technology.

*Part II, Iron and Steel;* 143 illustrations, 680 pages, 8vo, cloth 1883 . . . . . \$5

In this, the second volume of Professor Thurston's important work on the materials of engineering construction, the author has included a large amount of practical information not heretofore available without consulting many different authorities. The ores of iron, their classification, analysis and reduction have received thorough treatment. The construction and management of blast furnaces and the different operations connected therewith are comprehensively detailed. The subject matter comprehends all the practical operations employed in the manufacture of iron and steel, so simply expressed as to be readily understood by those of limited education. There are several chapters upon the strength, elasticity and resistance of the metals treated, under the effects of time, temperature and repeated strain, with the necessary formulae and diagrams. The work is valuable not only as a text-book for the student and engineer, but equally so as a work of reference for the manufacturer and mechanic. Considerable space is given to the most approved methods of manufacturing malleable iron, and the tests of iron and steel are carefully considered and illustrated by recent examples.

*Thurston.—Materials of Engineering; Part III. Non-Ferrous Metals and Alloys.* By Prof. Robert H. Thurston; illustrated, 575 pages, 8vo, cloth. . . . . \$4

This is the concluding volume of a work in three parts designed for engineers, students and artisans in wood, metal and stone. Part I discusses the non-metallic materials of engineering. Part II is entitled "Iron and Steel." In the present volume the history, general processes and properties of the metals and their alloys are considered in Chapter I. In Chapter II the non-ferrous metals, copper, tin, zinc, lead, antimony, bismuth, nickel, aluminium, platinum, mercury, &c., are specially described, together with their sources, distribution and methods of reduction. The remaining twelve chapters treat in detail upon the properties of alloys,

chemical and mechanical; the bronzes and brasses, their composition and uses; the kalchoids, or copper-tin-zinc alloys, and the other miscellaneous alloys; the manufacture and working of alloys; the strength and elasticity of non-ferrous metals; strength of bronzes and other copper-tin alloys; strength of brasses and other copper-zinc alloys; strength of the kalchoids and other copper-tin-zinc alloys; strength of zinc-tin alloys; conditions affecting strength, such as heat, change of temperature, effects of stress; and the mechanical treatment of metals and alloys; 96 tables of tests of the different materials are included and, a complete classified index accompanies the work.

*Bell.—Principles of the Manufacture of Iron and Steel, with Some Notes on the Economic Condition of Their Production.* By I. Lowthian Bell, F.R.S.; 10 full-page plates, 744 pages, 8vo, cloth. . . . . \$6

This extended and comprehensive treatise is an outgrowth, as stated by the author in his introductory chapter, of a request, from the British Iron Trade Association, to prepare a report on the present condition of the manufacture of iron and steel as illustrated by the objects displayed at the French International Exhibition of 1878, in Paris. This work contains not only the general results then arrived at, but also more extended investigations and experiments which it was considered necessary to pursue to thoroughly discuss the subjects under treatment. The appended headings of the 18 sections into which the volume is divided will give an idea of its scope:

Section I. Introductory. Section II. Historical. Section III. Direct Processes Preliminary Treatment of Materials for the Making of Malleable Iron. Section IV. for Blast Furnace. Section V. The Blast Furnace. Section VI. On the Use and Theory of the Hot Blast. Section VII. On the Quantity and Quality of the Fuel Required in the Blast Furnace Using Air of Different Temperatures. Section VIII. On the Solid Products of the Blast Furnace. Section IX. Chemical Changes as They Take Place in the Blast Furnace. Section X. On the Equivalents of Heat Evolved by the Fuel in the Blast Furnace. Section XI. On Hydrogen and Certain Hydrogen Compounds in the Blast Furnace. Section XII. On the Production of Malleable Iron from Pig Iron in Low Hearths. Section XIII. On the Refining and Puddling Furnace. Section XIV. On More Recent Methods of Separating the Substances Taken Up by Iron During Its Passage Through the Blast Furnaces. Section XV. Statistical. Section XVI. British Labor Compared with That of the Continent of Europe. Section XVII. On Labor in the United States of America. Section XVIII. Chief Iron-Producing Countries Compared.

*Bayley.—The Assay and Analysis of Iron and Steel, Iron Ores and Fuel.* By Thomas Bayley; 17 illustrations, 91 pages, 12mo, cloth. . . . . \$1.40

This little book is a reprint, with some additions, of a series of articles which have appeared in the *Mechanical World* (England). It is intended for practical men possessing some knowledge of chemistry as well as for students of chemistry in general. The methods of analysis described have been personally tested by the author in his extensive practice. A table of the atomic weights as recalculated by Mr. F. W. Clarke is included.

*Weeks.—Report on the Manufacture of Coke.* By Jos. D. Weeks, Special Agent; 26 (mostly full-page) illustrations, 114 pages, quarto. Paper, \$1.50; cloth, \$2.

As stated by the author, this report embraces the complete statistics of the production of coke during the census year 1880, together with such information regarding the characteristics of the works, material used and labor employed, as could be obtained. The work is divided in five parts. Part I is entirely statistical. The coal fields and coal of the United States in their relation to the manufacture of coke in the census year is discussed in Part II, together with the history of coke manufacture in the several states individually. Part III treats of the history of coking in Europe. In Part IV the subjects of coal and coal washing are considered, and the properties, composition and analyses of European and American cokes are discussed. Part V includes in detail descriptions of the various methods of coking: first, in piles or mounds; second, in rectangular kilns having brick or stone sides, and entirely open at the top; and, third, in closed kilns or ovens of brick and stone, together with the special adaptions of each form of oven to the coals of different localities. Full information is given as to the utilization of waste products. The illustra-

tions include maps of the coke-producing belt, the Connellsburg coke region, the New River of Kanawha coking coal field, and cuts of kilns, ovens and coking machinery.

## ENGINEERING AND MECHANICS.

*Waddell.—The Designing of Ordinary Iron Highway Bridges.* By J. A. L. Waddell, C. E. Numerous illustrations and seven folding plates showing bridges actually constructed, with their dimensions; 42 tables, 244 pages, 8vo, cloth. . . . . \$5

This work treats of the ordinary iron bridges of this country, and does not touch upon any of the numerous styles of truss bridges. Though written principally for engineers and students, it will prove useful to county and town officers. It contains tables and rules of simple application by which the weight of iron required for a first-class bridge may be readily ascertained, with an error of but from 1 to 3 per cent. The required amount of lumber, including or excluding waste, is also given. In the chapters on general specifications and bills of material and estimates of cost are rules and information by which a non-professional with a fair degree of accuracy may test the strength and estimate the cost of an iron bridge of any grade. In another chapter is given a list of all the members in the bridges treated, and this list, together with the complete glossary at the end of the book, will be of great assistance to one unacquainted with bridge-building. In the tables will be found the proper sizes for all cases of hip verticals, joists, hand-railing, guard rails, floor beams, beam hangers, lateral rods and struts, lattice rods, stay plates &c., also the most economic depth of truss and panel length.

*Seaton.—Manual of Marine Engineering.* By A. E. Seaton. Second edition, with numerous tables and 96 illustrations, reduced from working drawings; 437 pages, large 8vo, cloth; London, . . . . . \$7.20

This work comprises the designing and construction of marine machinery, as shown in the most recent practice of successful English engineers. The chapter headings include the following subjects: Horse-power, nominal and indicated, and the efficiency of the engine, resistance of ships, and indicated horse-power necessary for speed; space occupied by, and general description of, modern marine machinery; engines, simple and compound; expansion of steam, mean pressure, &c.; piston speed, stroke of piston, revolutions, size of cylinder, cylinder fittings, &c.; the piston, piston-rod and connecting-rod; shafting, cranks and crank shafts; foundations, bed-plates, columns, guides and framings; the condenser, pumps, valves and valve gear; valvodeograms; propellers; sea-cocks and valves; fuel, &c.; evaporation; boilers, their design, proportions, construction and fittings. The fitting-in of machinery, starting and reversing of engines and the materials used by the marine engineer, are also discussed. The author has treated each subject in detail, and as a work of reference the book is of decided value. The Board of Trade Rules for shafts, spare gear and boilers, and Loyd's Rules for machinery and boilers, are included in the work.

*Sinclair.—Locomotive Engine Running and Management.* By August Sinclair; 36 illustrations, 390 pages, 12mo, cloth. . . . . \$2

A practical treatise on the locomotive engine, with particulars showing how different kinds of trains are taken over the road with dispatch and economy. The work consists of chapters on engineers and their duties: inspection of locomotives; running a fast passenger train; running a fast freight train; hard steaming engines; injectors; accidents to the valve motion; accidents to cylinders and steam connections; the valve motion; laying out link motion; description of the Stevens and the Joy valve gears; the indicator; detailed directions about the care, management and repair of the Westinghouse air brake and of the Eames vacuum brake; method of finding the power, adhesion and traction of locomotives; easy method of testing water for locomotive boiler use, &c. Particulars of examination given to firemen for promotion on the leading railroads, and many other subjects interesting to those engaged in designing, handling or repairing the locomotive, are included. The writer's experience as a locomotive engineer and round-house foreman has fitted him to present the subject matter

of the book intelligently and in such a simple manner that the practical locomotive engineer and fireman, for whom the book is intended, can readily grasp the whole treatment of the subject.

*Weisbach, Dr. Julius.—The Mechanics of the Machinery of Transmission.* Second edition, thoroughly revised and greatly enlarged by Prof. Gustav Herrmann. Translated from the German by Prof. J. I. Klein. 448 illustrations, 544 pages, 8vo, cloth. . . . . \$5

From the translator's preface we learn that this volume is the first part of the second edition of what was formerly known as Vol. III of "Weisbach's Mechanics of Engineering." The work treats of the principles of kinematics, or, as the reviser states in a foot-note, "the study of those arrangements of the machine by which the mutual motions of its parts, considered as changes of position, are determined." Chapter 1 includes journals, shafting, couplings, and bearing; Chapter 2, gearing, and in Chapter 3 the subject of rods and their guides is considered. The illustrations and diagrams are well executed, and engineers may rely upon the accuracy of the formulae employed. The present volume will be followed by Part II, upon "The Mechanics of Machinery for Lifting and Transporting Materials," and Part III, considering "The Mechanics of Machinery for Changing the Form and Size of Materials."

*Richards.—Wood-working Machinery and the Arrangements of Factories.* By J. Richards; 64 illustrations, 150 pages, 12mo, cloth. . . . . \$1.50

The present work is a revised edition of the "Operator's Hand-Book," and is a treatise on the arrangement, care and operation of wood-working factories and machinery. It gives attention to every feature, from the planning of a planing mill to work in the most economical manner, and the setting of a steam boiler to the setting of knives in a planing machine, and the proper way to set about buying machinery to accomplish stated results. It is thorough and reliable.

## ENGINEER'S POCKET BOOK.

*Nystrom.—Pocket-book of Mechanics and Engineering.* By John W. Nystrom, C. E.; 18th edition, revised and greatly enlarged, with original matter, 660 illustrations, 671 pages, 16mo, pocket-book form. . . . . \$3.50

The present edition of this standard work has been thoroughly revised by the author, whose high reputation as an engineer and as an earnest worker in the advancement of mechanical science is sufficient guarantee of the comprehensiveness and accuracy of the book. It treats of the properties of air, heat and steam, the expansion of water, strength of materials, dynamics, acoustics, optics, assaying and chemistry. Tables of the circumference and the area of circles and the logarithms of numbers are included. Also the United States Standard and the Metric System of Weights and Measures and tables of the money and coins of the different countries of the world are given. A knowledge of algebra is not necessary for the use of the formulae. The new matter is principally elements of mechanics; static and dynamic tables; steam engineering; belting; gearing; wire ropes of iron, steel and copper; electro-dynamics and physical science in general.

*Trautwine.—Civil Engineer's Pocket Book.* By John C. Trautwine, C. E. Twenty-second thousand, revised, corrected and enlarged, by John C. Trautwine, Jr., C. E.; copiously illustrated, 866 pages, 12mo, morocco, pocket-book form, gilt edges. . . . . \$5

Many important additions and alterations have been made in the present edition of this excellent manual for engineers. It treats of mensuration, trigonometry, surveying, hydraulics, hydrostatics, instruments and their adjustments, strength of materials, masonry, principles of wooden and iron roof and bridge trusses, stone bridges and culverts, trestles, pillars, suspension bridges, railroads, turnouts, turning platforms, water stations, cost of earthwork, foundations, retaining walls, mortar, brick, cements, concrete, &c.

## SANITARY ENGINEERING, HEATING.

*Bayles.—House Drainage and Water Service.* By James C. Bayles; 5th edition, 3 folding plates and 30 illustrations, 365 pages, 8vo, cloth. . . . . \$3

This work discusses the subject of house drainage and water service in cities, villages and rural neighborhoods in a manner instructive alike to architects, mechanics and house owners. The best forms of plumbing practice are described and illustrated, and the principles upon which good work depends explained. The book is of practical value to the building trades and all interested in the mechanics of hygiene. The contents are as follows: Hygiene in its practical relations to health. Sewer gas. Waste and soil pipes. Traps and seals and the ventilation of soil pipes. Water closets. Service pipes and water service in city houses. Tanks and cisterns. The chemistry of plumbing. Elementary hydraulics applicable to plumbing work. Sanitary construction and drainage of country houses. Water supply in country districts. Suggestions concerning the sanitary care of premises. The plumber and his work.

*Hood.—Practical Treatise on Warming Buildings by Hot Water, Steam and Hot Air.* By Charles Hood; enlarged edition, 462 pages, 8vo, illustrated with numerous cuts; cloth. . . . . \$4.25

This book is divided into two general parts. The first subject considered in Part I is warming buildings by hot water. The subjects of circulation, permanence of temperature and construction of furnaces are carefully considered. Following this is an estimate of the heating surfaces required to warm any description of building. A chapter on heating by steam, another on heating by hot air, and two on the laws of phenomena of heat complete this division of the volume. Part II gives attention to the various methods of warming and ventilating buildings, the combustion of fuel, forms of fireplaces in chimneys, a chapter on the changes produced in atmospheric air, heat, combustion and respiration; a chapter on the various methods of producing ventilation, and one on the chemical constitution of coal and the combustion of smoke.

*Billings.—The Principles of Ventilation and Heating, and Their Practical Application.* By John S. Billings, Surgeon, U. S. A. 72 illustrations, 216 pages, 8vo, cloth. . . . . \$3

The author discusses the question of ventilation and heating from various standpoints, beginning with the expense and following by an explanation of the laws which must be observed in the successful accomplishment of this work. There is next presented a very comprehensive description of the various methods of heating, together with some particulars relating to patent systems. Schools, hospitals and other public buildings which require exceptional methods are discussed, and perhaps receive a little more attention than the ordinary house. Principles are so carefully stated in all cases that their application is obvious.

## MISCELLANEOUS.

*Dictionary to the Iron and Steel Works of the United States.* Prepared by the American Iron and Steel Association; 7th edition, corrected to September 1st, 1884, 202 pages, 8vo, cloth. . . . . \$3

This work is just what its title indicates. It embraces the blast furnaces, rolling mills, steel works, forges and bloomeries in every State and Territory. The names of establishments are given first, followed by the names of owners and their post-office addresses.

The book contains a complete summary of the number and capacity of the iron and steel works which are described in the present edition, compared with the summary which accompanied the previous edition, which was corrected to July 25th, 1882.

*Lamberson.—Hardware Price Book.* Pocket edition, revised and improved, 244 pages, 4 x 7 inches, leather. . . . . \$4

This book is well classified and indexed, and the rulings are so arranged that they can be adapted to any stock of general hardware. The pocket edition published in 1875 had many good features, but its imperfect arrangement was a serious objection to it. In the present edition the most important change is in the alphabetical arrangement, which appears to be very complete. The headlines are printed like the catch-words in a dictionary, on the upper corner of each page, so that reference may be made to any article, even without the use of the index.

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| <i>Expansive Bits.</i> Expansive Bits. Ives' No. 4, per doz. \$0.50, dis 35¢ & 35¢                      | <i>Aug. 10.</i> 50¢                                 | <i>Aug. 10.</i> 50¢                         | <i>Humason &amp; Beckley.</i> dis 15¢ & 25¢   | <i>Humason &amp; Beckley.</i> dis 15¢ & 25¢   |
| <i>Expansive Bits.</i> Expansive Bits. Ives' No. 4, per doz. \$0.50, dis 35¢ & 35¢                      | <i>Aug. 10.</i> 50¢                                 | <i>Aug. 10.</i> 50¢                         | <i>Verree.</i> dis 15¢ & 20¢  | <i>Verree.</i> dis 15¢ & 20¢  |
| <i>Expansive Bits.</i> Expansive Bits. Ives' No. 4, per doz. \$0.50, dis 35¢ & 35¢                      | <i>Aug. 10.</i> 50¢                                 | <i>Aug. 10.</i> 50¢                         | <i>Magnetic Tack, Nos. 1, 2, 3, \$1.25, 1.50 and 1.75.</i> dis 25¢ & 10¢  | <i>Magnetic Tack, Nos. 1, 2, 3, \$1.25, 1.50 and 1.75.</i> dis 25¢ & 10¢  |
| <i>Expansive Bits.</i> Expansive Bits. Ives' No. 4, per doz. \$0.50, dis 35¢ & 35¢                      | <i>Aug. 10.</i> 50¢                                 | <i>Aug. 10.</i> 50¢                         | <i>Providence Tool Co., Hand Cuffs, \$15.00 per doz. dis 10¢</i>  | <i>Providence Tool Co., Hand Cuffs, \$15.00 per doz. dis 10¢</i>  |
| <i>Expansive Bits.</i> Expansive Bits. Ives' No. 4, per doz. \$0.50, dis 35¢ & 35¢                      | <i>Aug. 10.</i> 50¢                                 | <i>Aug. 10.</i> 50¢                         | <i>Tower's.</i> dis 10¢ & 15¢   | <i>Tower's.</i> dis 10¢ & 15¢   |
| <i>Expansive Bits.</i> Expansive Bits. Ives' No. 4, per doz. \$0.50, dis 35¢ & 35¢                      | <i>Aug. 10.</i> 50¢                                 | <i>Aug. 10.</i> 50¢                         | <i>Daly's Improved Hand Cuffs: 2 Hands, Polished, \$ per doz. 4¢; Nickel, \$5.75; 3 Hands, Polished, \$ per doz. 7.25; Nickel, \$9.</i> dis 20¢ | <i>Daly's Improved Hand Cuffs: 2 Hands, Polished, \$ per doz. 4¢; Nickel, \$5.75; 3 Hands, Polished, \$ per doz. 7.25; Nickel, \$9.</i> dis 20¢ |
| <i>Expansive Bits.</i> Expansive Bits. Ives' No. 4, per doz. \$0.50, dis 35¢ & 35¢                      | <i>Aug. 10.</i> 50¢                                 | <i>Aug. 10.</i> 50¢                         | <i>H</i> <i>Hack Saws.</i> Griffin's Hack Saws, complete. dis 40¢ & 10¢   | <i>H</i> <i>Hack Saws.</i> Griffin's Hack Saws, complete. dis 40¢ & 10¢   |
| <i>Expansive Bits.</i> Expansive Bits. Ives' No. 4, per doz. \$0.50, dis 35¢ & 35¢                      | <i>Aug. 10.</i> 50¢                                 | <i>Aug. 10.</i> 50¢                         | <i>Griffin's Hack Saw, Blades only.</i> dis 20¢ & 10¢   | <i>Griffin's Hack Saw, Blades only.</i> dis 20¢ & 10¢   |
| <i>Expansive Bits.</i> Expansive Bits. Ives' No. 4, per doz. \$0.50, dis 35¢ & 35¢                      | <i>Aug. 10.</i> 50¢                                 | <i>Aug. 10.</i> 50¢                         | <i>Calipers.</i> dis 25¢  | <i>Calipers.</i> dis 25¢  |
| <i>Expansive Bits.</i> Expansive Bits. Ives' No. 4, per doz. \$0.50, dis 35¢ & 35¢                      | <i>Aug. 10.</i> 50¢                                 | <i>Aug. 10.</i> 50¢                         | <i>B</i> <i>Boards and Box.</i> dis 40¢ & 10¢ & 2¢  | <i>B</i> <i>Boards and Box.</i> dis 40¢ & 10¢ & 2¢  |
| <i>Expansive Bits.</i> Expansive Bits. Ives' No. 4, per doz. \$0.50, dis 35¢ & 35¢                      | <i>Aug. 10.</i> 50¢                                 | <i>Aug. 10.</i>                             |   |   |





## INDUSTRIAL ITEMS.

## MAINE.

The Lewiston Electric Light Company, Lewiston, now use sawdust for fuel, costing only 75 cents per cord, delivered. They find this fuel more economical than screenings for making steam. Their boilers are set with the Jarvis patent setting, and use Sheffield grate-bars. They use the Armstrong & Sims engines belted direct to the dynamos.

## NEW HAMPSHIRE.

The Exeter Machine Works, Exeter, have recently built one 150-horse-power engine for H. H. Amsden & Son, Penacook, and complete steam-heating apparatus for the Profile House, White Mountains. The have also an order for one small engine for Eaton & Sears, Danvers, Mass., and sundry orders of less importance, under way.

The Forsaith Machine Company, Manchester, have begun the manufacture of electric-light dynamos of a new and improved pattern.

## MASSACHUSETTS.

Pattee & Draper, Holkoke, manufacturers of fire hydrants, have removed to a new brick building erected by themselves, situated at the corner of Commercial and Hampshire streets. The structure is 120 x 35 feet, with an L 15 x 35 feet, and is two stories high.

The Whittier Machine Company, of Boston, are making a 125-horse-power boiler for the Brookline Electric Light Company. It will be set with the Jarvis patent boiler setting, and use the National rocking grate-bar.

The Burleigh Rock Drill Company, Fitchburg, are bringing out a new refrigerating and ice-making machine. They have sent several sets to the Southern States, and will have one on exhibition soon in a building near the home office.

The Douglas Axe Company, East Douglas, have finished taking account of stock and resumed work in nearly all the departments.

The Atherton Machine Company, Lowell, have purchased of the Lanphear Machine Company, Phenix, R. I., all of the tools and patterns used by the Lanphear Machine Company in making the spinning and drawing frames for which they have achieved such an enviable reputation. The Atherton Machine Company are now prepared to furnish spinning and drawing frames to any who may desire them.

The committee of the creditors of the Lamson & Goodnow Mfg. Co., Shelburn Falls, reported, at a meeting called for the purpose, that the indorsed paper should be scaled 30 per cent. and the unindorsed 50 per cent.; that the property should be bonded for the payment in five years, with 5 per cent. annual interest. A trustee is to be appointed to run the plant. All the creditors present acquiesced. Within six weeks the works will probably be under full headway. Seventy-five thousand dollars preferred stock will be issued for running capital.

The Weymouth Iron Works will shut down soon on account of the small demand for nails.

The Greenfield Tool Company, of Greenfield, are enlarging their building next to the railroad track. It will be, when completed, of brick, 35 x 190 feet, two stories high.

## CONNECTICUT.

The Pratt & Whitney Company, Hartford, are making an 1800-pound hammer with a 10,000-pound anvil for Desoton, Bently & Garland, of Philadelphia. The anvil is one of the largest ever made there, and will be one casting.

The Russell & Erwin Company, of New Britain, have bought a controlling interest in the Dayton (Ohio) Screw Company, and reorganized the Board of Directors and the list of officers. Mahlon J. Woodruff, of New York, the treasurer of the Russell & Erwin Mfg. Co., is now president of the Dayton Screw Company, and Henry E. Russell, Jr., of New Britain, the secretary of the Russell & Erwin Mfg. Co., and William G. Smythe, of New York, is agent for the Dayton Screw Company. The Dayton Company have a capital of \$350,000 and have been active competitors of the Russell & Erwin Company. The production of the two companies is said to be larger than that of any other screw-making concern in the country.

The Southington Cutlery Company's britannia department will shut down for two or three weeks.

A patent has been granted to L. P. Smith, Hartford, for an automatic screw machine, which is a remarkable invention. A machine already constructed has turned out 2500 screws per day, which is about twice the quantity that can be made on a hand machine. As it is perfectly automatic, a large number can be operated by one man, and it turns out a screw from round or square wire. The patent covers 25 distinctive claims.

## NEW YORK.

The Burden Works, Troy, will run without change until about July 1, when the usual summer stoppage for repairs will be made, lasting from a month to six weeks. Last year at this time the works were closed.

The Sheldon Axe Works, of Auburn, are to be removed to Scranton, Pa. They have a capital of \$400,000 and will give employment to 1000 men. This acquisition to the manufacturing industries of the City of Scranton was mainly accomplished through the personal efforts of Col. J. A. Price, the president of the Board of Trade.

The Schenectady Locomotive Works, Schenectady, are building at the rate of 10 locomotives per month.

The Wagner Car Company, of Buffalo, have leased the Jones Car Works, at Schenectady, and will take possession July 15. The Buffalo works will be removed to Schenectady in the fall. The Jones Works

have facilities for employing 350 men and the Wagner Works employ 160 men. These forces will be united, and an establishment expected to rival the Pullman Works is to be built up.

It is proposed that the capital stock of the reorganized Albany and Rensselaer Iron and Steel Company be \$2,500,000. Of this, \$1,750,000 have been subscribed, and \$250,000 pledged, leaving unpledged only \$500,000, which will probably be taken in Troy. Erastus Corning puts in the present works, valued at \$800,000, the cost of the furnace, estimated at \$600,000, and \$100,000 for a new roof on the steel works and repairs, leaving a working capital of \$1,000,000.

## NEW JERSEY.

The Trenton Iron Company, of Trenton, are to take up the manufacture of barb wire. A galvanizing plant is now being placed in. A separate building for the manufacture of picket fences is being erected.

## PENNSYLVANIA.

The Tanite Company, Stroudsburg, report a steady demand for their emery-wheels and grinding machinery, which has kept them busy through all the period of dullness. They are about to bring out some new grinding tools which will be of interest to machinists.

There are now no furnaces in blast in the Allegheny Valley District. Rebecca Furnace, at Kittanning, the only one in blast for some time, blew out early this month.

Four new wells are under way in the Murrysville gas district.

The coke ovens at Spring Grove, Fayette County, are being torn down and the stone shipped across the river to the new ovens now being erected on the Dickerson Run branch of the P. McK. & Y. R. R., by Brown & Cochran. Fifteen of the 100 coke ovens under construction by this firm, will be fired up this week. The remainder will be charged as fast as finished.

J. B. Moorhead & Co. blew in their Merion Furnace, in West Conshohocken, on June 9. The furnace has been standing idle for some weeks, during which time it has undergone general repairs. A good number of men will be given employment.

The puddle furnaces in the plate mill of the Pottstown Iron Company will start up double turn this week.

The Everett Glass Company organized recently by the election of Hon. John Cessna as president; John A. Gump, vice-president, and Dr. H. H. Hill, treasurer.

It is expected that the Gibralter Iron Works of Seyfert & Co., near Reading, will start up soon, all arrangements having been completed. About 100 hands will be employed, and the orders received will keep the mill in operation for a long time.

The court has ordered the trustees' sale of the Glendower Iron Works to be set aside and has ordered a new sale. The sale will take place on Saturday, September 19, 1885.

The manufacture of apple parers for use next fall has been commenced at the Reading Hardware Works. Their parer is said to be one of the best in the market, and they expect to make nearly 10,000 to meet the demand for the coming season. They have made many hundred thousands of parers.

A syndicate of Mercer County capitalists recently commissioned Hon. Earl A. Wheeler to visit England to confer with Alfred Davy, inventor and proprietor of the Davy process of steel manufacturing, and inquire into the feasibility of erecting large steel works on that plan in that locality. The conference is believed to have resulted satisfactorily, and Mr. Wheeler, accompanied by the inventor, has taken passage for America and is expected in Sharon in 10 days. Those interested say that it is probable there will be steel plants located at Sharon, Sharpsville and Middlesex.

The Newcastle Plow Works were organized by the election of the following officers, at a meeting of the stockholders, held Friday of last week: Directors, Charles S. Clark, Thomas Waddington, Joseph M. Burton, S. S. Smith, W. S. Felton; president, Charles S. Clark; secretary and treasurer, Joseph M. Burton. Messrs. Burton and Waddington, into whose hands the matter had been given, stated that they had closed the purchase of the North Fairfield Works for \$16,000, and that the machinery, patterns, &c., would be in Newcastle about the 25th of June. The plow has been christened, and will hereafter be known as the "Keystone Chilled Plow." The company, as stated before, have purchased the Keystone Foundry and Machine Shop, where the plows will be made, and a new building is to be erected for fitting them up ready for shipping.

An explosion of gas occurred a few days ago at Isabella Furnace, Barneston, Chester County. One employee was killed and several others were injured. The cause of the explosion is unknown. This furnace certainly seems unfortunate.

## PITTSBURGH AND VICINITY.

The Burden Works, Troy, will run without change until about July 1, when the usual summer stoppage for repairs will be made, lasting from a month to six weeks. Last year at this time the works were closed.

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have facilities for employing 350 men and the Wagner Works employ 160 men. These forces will be united, and an establishment expected to rival the Pullman Works is to be built up.

The Howard Furnace report that they are out of blast, stock consumed, hands scattered, and that they will be idle during 1885.

The Crown Flint Works, at Ravenna, have shut down on account of the scarcity of coal, resulting from the miners' strike in the Ohio Valley. They will resume operations about July 1.

The Ironton Furnace is drying out. Stock will commence coming in at an early date, and some time this week the furnace will blow in.

The Etna Iron Works, Pittsburgh, have practically passed into the hands of Mr. A. Pluemner, who has purchased over half the stock at 10 cents on the dollar, giving his notes therefor at 6 and 12 months, without interest. Messrs. Ellison, Dempsey, McGovney and Enoch each retain one share of stock, so as to remain on the Board of Directors and keep the organization intact. The substantial result of the transaction is that the stockholders get rid of their stock at 10 cents on the dollar and escape further liability. What Mr. Pluemner's engagements or plans are we do not know, nor does any one but himself, but in a few days we shall know, for the transaction will probably be completed very soon. Mr. Pluemner is a gentleman of energy and high character, and he has always had strong confidence in the iron-making facilities of Etna. We trust his venture will prove of profit to himself and the community.—Ironton Register.

The Belfont Iron Works Company announce that at the annual meeting of their stockholders, on July 15, there will be submitted to the stockholders the question whether the company shall engage in and carry on the business of manufacturing steel, either alone or in connection with others.

## ILLINOIS.

A new engine lathe for turning shafting is being built at the Columbian Iron Foundry and Machine Tool Works of Chicago. It is the invention of Nicholas Thomas, the superintendent of the works, and as an especial feature has the bottom formed into a trough to be filled with water, in which the shafting to be turned is submerged. The cutting tools, three or four in number, are set in a circle and made double. They are set starting at opposite ends of the shaft and work toward the center, or, if preferred, they may be set in the center and worked outward to the ends of the shaft.

J. P. Marsh & Co., of Chicago are in receipt of a second order from the Fitzroy Meat Preserving Works, of Rockhampton, Queensland, Australia, for 20 per centimeter gauges and one screw test pump and test gauge. The company are placing upon the market an entirely new automatic air-valve, for which they have already secured a number of large orders. They are busy in their steam-gauge department.

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## MISSOURI.

We are informed by Mr. W. W. Waugh that the Belleville Nail Company, Belleville, have determined upon the erection of a steel plant, but are as yet undecided as to the process. It will be either the Gordon patent or the Bessemer. A 3 or 4 ton converter will be erected in the near future. None of the contracts have been let. The Belleville Nail Company have an abundance of room for the contemplated works, and believe that they have one of the best locations in the West for the same.—St. Louis Age of Steel.

## MISSOURI.

The Pond Engineering Company, of St. Louis, have been awarded the contract for the complete plant of pumping machinery for the Mason City (Iowa) Water Works. It will consist of two Blake duplex pumping engines having a combined capacity of 1,500,000 gallons in 24 hours, with boilers, feed pump, heater, &c. The competition was very great in this work, and the Pond Engineering Company are to be congratulated for being able to secure the contract under such circumstances.

## MISSOURI.

The St. Louis Sash Weight Company have not lost a day this year, and have sold their product about as fast as made. They are moderately busy now.

## INDIANA.

The Shumard Sash Balance Company, Richmond, are running full and are a month behind orders. They have lately enlarged capacity and have still in contemplation further additions to their business to meet the increasing demands for their sash balances.

## MINNESOTA.

The Minneapolis Flint Glass Works are to be reconstructed, under the management of Mr. M. Krebs, formerly of the Enterprise Glass Company, Ravenna, Ohio, and plenty of capital is on hand to bring the project to a successful issue. The cause of the recent suspension of these works is said now to be not for want of money, but because of the inefficiency of the constructors, who built the works so that everything has to be pulled down and rebuilt. They will be able to start again shortly.

## MICHIGAN.

The Jackson Agricultural Company, engaged in the manufacture of harvesting machines, have moved their manufactory from Jackson to Detroit.

## OHIO.

The Buehl Iron Works, of Detroit, ceased operations on June 11, throwing 50 men out of employment. When running with full

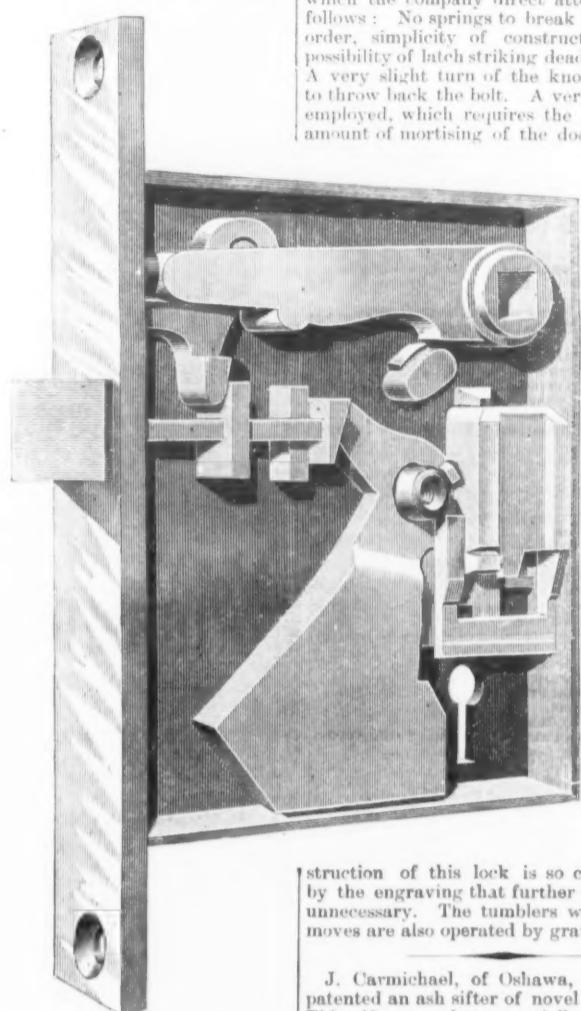
force about 400 were employed, but the force had been reduced on account of the hard times.

We learn from the Fond du Lac Commonwealth that fires were lighted in the blast furnace at that place Thursday, and that the blast will be turned on Monday. The paper states, further, that the improvements made recently give the furnace a producing capacity of about 40 tons of iron per day. The company have made a contract with the Winthrop and the Lake Superior mining

handles are described as made of iron and the blades of the best cast steel. The tool is 6 inches long, with a cutting edge of 3 inches, and is designed especially for amputees and pattern makers.

## New Gravity Lock.

The annexed engraving represents the internal arrangement of a simple Gravity Lock which the Union Door Knob Company of Detroit, Mich., are at present putting upon the market. The special claims to which the company direct attention are as follows: No springs to break or get out of order, simplicity of construction, and impossibility of latch striking dead on the jamb. A very slight turn of the knob is sufficient to throw back the bolt. A very thin case is employed, which requires the least possible amount of mortising of the door. The con-



New Gravity Lock.—Union Door Knob Co., Detroit, Mich.

panies for ore to be used in the furnace. Twenty-five carloads of the Winthrop ore arrived Wednesday night, and some from the other company is expected soon. The furnace will be put into blast on 40 per cent. of Winthrop hematite, 40 per cent. of Lake Superior hematite, and 20 per cent. of Lake Superior specular ore. About 25 men will be employed.—Marquette Mining Journal.

## WEST VIRGINIA.

Work was commenced on June 9, tearing down the heating furnaces at the Riverside lower mill, preparatory to removing this part of the works to the new building on the company's ground at Benwood, adjoining the blast furnace and steel plant. The decision of the Riverside Company to remove their furnaces outside of the city limits was announced some time ago. The reason given is the need of more room and the convenience of the new plan.

The La Belle Glass Company are about to form from their own stockholders and others a syndicate who will make a proposition similar to the one recently made by Wheeling parties, but not accepted. The proposition will be to pay off the indebtedness of the company for one-half the stock, and at once put the factory into operation. Those interested in the scheme are sanguine of its success.

## NORTH CAROLINA.

It is reported that a new glass factory is about to be erected in Swain County.

## MARYLAND.

There is some talk of a new glass factory on the co-operative plan being started in Baltimore by the glass blowers. About \$12,000 capital is expected.

## TENNESSEE.

The South Tredegar Nail Works, at Chatanooga, on June 8 began the manufacture of steel nails, and will turn out 1000 kegs per day.

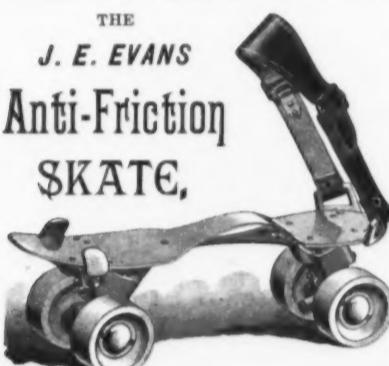
## KENTUCKY.

The Dow Wire Works Company, Louisville, have purchased the stock and machinery of the Southern Wire and Iron Works Company, and contemplate establishing wire works to employ about \$40,000 capital in some Southern city.

## TEXAS.

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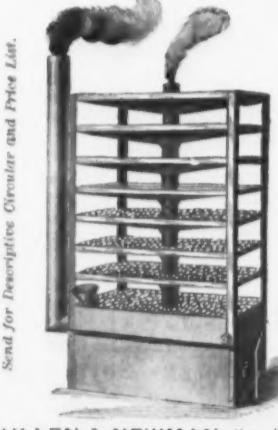
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| LOG RULE     | 14 | 22 | 52 | 43 | 56 | 69 | 92 | 102 | 125 | 139 | 152 | 172 | 210 | 245 | 266 | 292 | 320 | 401 | 430 | 470 | 14 |
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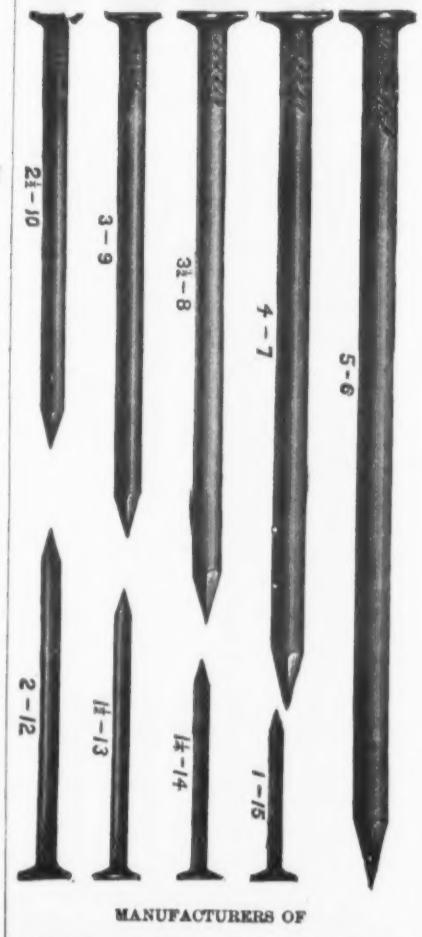
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Improved for 1885.

W. T. STILES, Hammond, N.Y.

June 18, 1885.

## THE IRON AGE.

35

## THE WEEK.

In their argument before the United States Senate Select Committee on Interstate Commerce, the Illinois Railway Commission favored a Federal commission to supervise the various State commissions.

About imported rags the Secretary of the Treasury directs that old rags shall be admitted to entry at the custom house only upon the production of permits from the health officers at the ports of inspection authorizing the landing of the same.

A report from the Mexican capital is to the effect that the national bank of that city has loaned President Diaz about \$4,000,000 in return for the exclusive privilege of issuing circulating notes, and that now the London Bank of Mexico offers to loan the Government \$8,000,000 if permitted to retain its former privilege as to circulation.

The scheme of supplying water to both Newark and Jersey City by means of a dam at Bloomingdale, as proposed by the State Commission, is indorsed by State Geologist Cook.

Tacoma, Wash. Ter., reached from the ocean through Puget Sound, is sometimes pronounced the "Pittsburgh of the West." T. L. Nixon, formerly of Pittsburgh, speaks of the coal fields in that region as extensive, while iron ore is found in abundance, and of lumber the mills of Tacoma alone cut 225,000 feet per week, which is shipped principally to China, Australia and France.

An iron screw-tug, 31 feet long, has been launched by Capt. Tom King at Vicksburg, the first of its kind ever built in that city.

The National Cable Railway Company have notified the trustees of the New York and Brooklyn Bridge that they were infringing upon certain patents owned by the National Cable Company. These patents, the notice averred, were purchased by the National Company of the Cable Railway Company of California, and related to the gripping devices for propelling cars. The National Company, the notice says, would gladly entertain any proposition looking to an equitable adjustment of their claims.

The new building law for New York City has been signed by the Governor, and takes effect immediately.

The Harrison Wire Works plant, in St. Louis, was sold on the 11th inst., under order of the court. George T. Crane and James Cumiskey bought in the property for \$30,000, subject to a mortgage of \$15,000.

The scramble to secure Government contracts which prevailed in Russia during the recent war flury is spoken of by a correspondent of the London *Times*, who wrote as follows: "To insure the acceptance of their tenders the competitors scatter money right and left, hundreds of thousands, even millions, of roubles finding their way into the pockets of people of influence, of their friends, kinsfolk and mistresses. These gentlemen reckon, and with good warrant, on the venality of the doctors and military commanders, by whose connivance they hope to recoup the money they thus dispense, and millions in addition. On the other hand, the necessity of bribing everybody, the impossibility of making a single step without payment, obliges the contractors to take out the difference in the quality of the stores and provisions which they deliver for the use of the army. In Russia highly-placed personages, as is natural, deign only to accept bribes of considerable amount."

A patented machine was on exhibition at New Orleans for freeing the fiber of hemp and flax from the woody substance which it is desirable to separate from it, and gave greatest satisfaction. The ramie plant taken green from the field, leaves and all, was perfectly divested of everything but the clean and perfect fiber ready for use. The dry stalks of ramie and jute were decorticated with equal success. There appears to be no doubt that this machine will lead to valuable results by cheapening the raw material for the textile industries.

The catamaran Jesse made the remarkable speed of 20 miles an hour in New York harbor last week, which is claimed to be the fastest time ever made by a sailing craft.

Warren Roosevelt, of this city, is building an oil dock for R. T. Bush, at South Brooklyn, which will contain 1,500,000 cubic feet of timber.

The freight tariff on the Pacific slope is considered reasonable for the services performed. From San Francisco to Portland, Oregon—distance, 800 miles—the rate is but \$4 per ton. From same point to Puget Sound or Victoria, B. C., \$5 per ton, and to Alaska \$6 to \$12 per ton. In addition to these rates a charge for primage amounting to 5 per cent. of the rate is added upon all ocean freights, together with customary wharfage charges.

The East River Bridge was brilliantly lighted up by the burning of a tall building near by, in Frankfort street. Are engineers prepared to say what effect upon the bridge cables a large conflagration might have in case the fire is directly beneath?

The little cigar-shaped steamer Stiletto, only 90 feet in length, built by Herreshoff Bros., outstripped the famous steamer Mary Powell last week in a run up the North River. At Yonkers she was a mile ahead,

carrying 120 to 138 pounds of steam. It was said by her builders that she could carry 220 pounds of steam and run at the rate of 27 miles an hour. The run to Sing Sing, 32 miles, was made in 1 hour and 15 minutes. Captain Cornell, of the Powell, denied that there had been a race.

Under a new law signed by the Governor, three commissioners, to be appointed by the mayor, comptroller and president of the Board of Aldermen, are to erect a suitable bridge of stone, steel or iron on the Harlem River at a point 1500 feet north of High Bridge. The bridge is to be completed in three years, and the commissioners are to hold office for that period without salary, but may provide all necessary materials and employ workmen. The bridge is to be 80 feet wide and 145 feet above high-water mark.

H. Comegys, of St. Louis, proposes to maintain a water-works plant costing \$75,000, with 5 miles of drains and 50 hydrants, in Shelbyville, Ill., for an annual payment by the city of \$50,000.

France proposes to maintain her position in Madagascar and is prepared to go further. Meanwhile foreign commerce is extinct.

It is estimated by the president of the Lumber Manufacturers' Association that the log supply of the Northwest for 1885 will be at least 2,000,000,000 feet less than the supply of 1884. "But," says the Chicago *Times*, "even this very large curtailment of the supply is not radical enough, as the cut is still greater than the demand warrants."

The second trial of the case of Pierre Chouteau vs. the Jupiter Iron Works, commenced before Judge Thayer, in St. Louis, on the 8th inst. Chouteau alleges that he contracted to use the furnaces of the works for a specified time, but was precluded from carrying out the contract. He asks for about \$50,000 damages.

The monthly report of the Bureau of Statistics will be resumed.

Prof. I. P. Bishop, lecturing on the salt industry of Western New York, expresses the opinion that that region will yet become the greatest salt-producing district in the world. The works now erected and in operation have a capacity of nearly 2,000,000 barrels per annum, and four other works are now in process of erection.

The works of an electric supply company at Lynn, Mass., are preparing the plant of 90 arc lights, with dynamos and boilers complete, for Lima, to be followed at short intervals by apparatus for several other cities. In all cases iron lamp-posts will be used.

Jay Gould's Mexican Southern Railroad concession was forfeited for a non-performance of contract obligations, and \$50,000 on deposit as a guarantee was covered into the Government Treasury.

The principal Transatlantic steamship lines have advanced steerage rates 25 per cent.

The rope-walk at Bushwick, L. I., 1700 feet in length, is said to be the largest in the United States. About 100 sizes of rope are made, running from  $\frac{1}{4}$  inch to 24 inches in diameter. The length of large rope is generally 1000 feet, and the largest rope made nowadays is 15 to 18 inches, and no larger rope or hawser is made except to order. The building is 1700 feet long.

The total immigration for May at all the ports in the United States was 66,971, as compared with 82,581 for the same time in 1884. For 11 months the total is 343,439, against 454,206 last year.

In the case of Abram S. Hewitt and others against the Pennsylvania Steel Company, in which the defendants are charged with infringing the Martin patent of 1868, commonly known as the open-hearth process, the United States Circuit Court in Philadelphia decides that it has no jurisdiction.

A new industry has sprung up in Uruapan, Mexico. The famous coffee of that region is now put up in bottles, in the form of an extract, which is shipped to all parts of Mexico, and an effort is being made to introduce it into the United States.

One of our maritime papers calls attention to the extraordinary performances of the El Dorado steamship, one of four vessels built on the same model by Cramp & Sons and the Harlan & Hollingsworth Company, of Philadelphia and Wilmington, respectively. They are of the following dimensions: 300 feet long between perpendiculars; 350 feet over all; 42 8-12 feet beam; 32 1/2 feet deep. The aim in designing was for 9500 to 10,000 bales cotton capacity, an average speed of 12 miles per hour and draft not to exceed 18 feet, cotton loaded. These ships have now been steadily employed eight to nine months, generally making their time 12 to 18 hours quicker, and frequently in 24 hours less, than that for which they were designed, and on both the outward and inward passages have reached within an hour or so of the very best record. Take them all in all, considering the objects sought for, these steamers have had remarkable success. "We much doubt," says our contemporary, "whether our English friends can or have produced equal results in all the needed requisites in the attainment of such successful design."

A certificate to incorporate the American Cable Company was filed in this city on the 12th inst. The object is the manufacture

and sale of materials to be used in the construction of cable railroads. The trustees are Howard Scribner, C. Densmore Wyman, Augustus Hutchings, G. Hilton Scribner, Waldo Hutchings, William Hechert and Captain Cornell, of the Powell, denied that there had been a race.

A great wooden ship measuring 2600 tons, the largest with a single exception ever built in the United States, will soon be ready for launching from the yard of Carleton, Norwood & Co., at Rockport, Me. Her length of keel is 263 feet, and she will cost about \$150,000.

A bill hostile to contract labor in the State penitentiaries has passed the Upper House of the Illinois Legislature.

The State Department has received from the German minister a communication stating that according to the Imperial law of November, 1874, for the protection of trade marks, a registered trade-mark is forfeited if to years have elapsed since its registration without any notice having been given of its further extension, or if the same period has elapsed since such notice without a further renewal of the same. As this law took effect May 1, 1875, it will be necessary for American manufacturers to take prompt action if they desire to retain their trademark rights in Germany.

Charles Van Bokkelen, a citizen of the United States and an ex-consul of Hayti in New York, was released from the San Domingo prison in which he has been confined for about 18 months for debt, in defiance of international treaty obligations. It is surmised that the expected arrival of the new American minister in a war ship had a salutary effect.

Florida orange growers have arranged to sell 1,000,000 boxes of fruit in New York during the coming season.

A proposition from representatives of the Sanderson Brothers Steel Company, of Sheffield, England, to buy out the Sanderson Steel Works, in Geddes, at 50 cents on the dollar has been accepted. The stock bought consists of \$97,000 owned in Syracuse, \$5000 in Auburn and \$18,000 in New York.

The Postmaster-General has decided not to advertise for bids to enter into contract for the transportation of the foreign mails upon a mileage basis under the permissive authority conferred by the act of Congress of March 3, 1885.

Only four locomotives, it is stated, were shipped from the Paterson shops during May, which is the smallest number since 1877.

Twenty additional inspectors, to be sanitary engineers, will be commissioned to assist in enforcing the health laws of New York City.

It is proposed to form a Central Labor Bureau in Europe for the purpose of taking care that American employers do not import European mechanics to this country, to the detriment of American workmen.

Among the contracts for Indian supplies let on the 13th inst. were 206,500 pounds of barbed and galvanized fence wire to S. H. Crane, Chicago, at 4 1/2 cents per pound; A. Henley, 71,000 pounds fence wire at \$4.25 per 100 pounds.

The amount expended thus far on the State Capitol building at Albany approximates \$18,000,000, and \$25,000,000 is spoken of as the possible ultimate cost. The grand staircase and tower are receiving the most attention from the stone cutters. About 650 workmen are employed.

The entire Chinese collection at the New Orleans exposition has been presented to the University of Michigan, and will be placed in the University Art Museum.

President White, of Cornell University, in his annual report to the Board of Trustees urges the necessity of appointing a full professor of mechanical engineering, in addition to the two professors and two assistant professors now directly connected with Sibley College, and proposes that the new professor of mechanical engineering shall be styled "Director of Sibley College," be given great powers, and be held to commensurate responsibilities. It is stated that the special committee of the University, which has been in session during the past winter in New York City and Ithaca, will report unanimously for this position an Eastern man who is identified with one of the leading technical schools.

By the approval of Governor Hill the act of the Legislature passed last year ordering wires underground will be enforced by an underground wire commission.

Mr. Gladstone's resignation has been accepted, and Lord Salisbury has consented to form a Ministry, with Sir Stafford Northcote as Chancellor of the Exchequer.

About 800 tons of flat rails for the Electrical Railway Company are being hoisted to the track in Second avenue, in this city, and by July 4th cars will be running on the cable railroad in Tenth avenue.

The distinctive feature of the United States and national bank note paper now adopted by the Secretary of the Treasury is a single blue silk thread running through the body of the paper.

The headquarters of the hydrographic party now engaged in a survey of the harbor of New York are on board the schooner

Eagle, formerly known as Commodore Gorner's yacht Mohawk, anchored off Governor's Island. Operations are conducted by Lieutenant Hawley, U. S. N. Soundings are to be made not only in the stream, but also in all the docks or slips, and their depth will be determined and indicated on the charts, even up to the bulkheads. This will be a notable gain for the masters of merchantmen, who, when coming to this port and knowing at what wharf they are to unload, may thus learn at once by their charts whether they need to wait for the tide before entering the slip. Characteristics of the bottom will also be observed. Another important feature of this survey will be the study of the currents in every part of the bay and rivers, their direction and strength, and the variation of these at flood and ebb tide and at different phases of the moon.

The contract for the construction of the new ordnance dock in the navy yard at Brooklyn was awarded to Thomas O'Connell. The dock will cost \$50,000, and the job is to be completed in six months.

The committee having in charge the proposed reopening of the New Orleans exposition next winter are said to have adopted a charter and elected managers, and contemplated the purchase of the old building and plant for \$150,000. George M. Pullman is spoken of as president and Samuel Buck director-general of the new organization.

Our attention has been called to an error in our statement made last week that the cost of the ironwork of the Brooklyn Bridge erected was 3.22 cents. It was 3.32 cents per pound.

James Henry Rutter, president of the New York Central and Hudson River Railroad Company, died in Irvington on the 12th inst., of diabetes. He was born February 3, 1836, and the first steam whistler heard in this country, attached to an engine on the Boston and Lowell Railroad, was blown in honor of the event.

Inspector D'Oench was appointed superintendent of the Bureau of Buildings on the 12th inst. under the new building law. The Building Bureau has control of elevators and can close theatres which are not furnished with brick proscenium arch. Buildings over 70 feet high must be fire-proof, and tenements over 65 feet high must have the stairs fire-proof and inclosed in brick well-holes.

Speaking of depression in the glass trade, a large importer remarks that the cause is overproduction. The manufacturers began business this year with the expectation of turning out 3,600,000 boxes of glass in 10 months. A box contains 50 square feet, and 180,000,000 feet of glass are more than the market can stand. The mills that then began work represented a total of 942 pots.

Of this number, factories representing 240 pots had already ceased work on the 1st of May, 92 pots having been closed in the month of April alone. Last year the importing trade diminished 50 per cent.

Governor Hill has approved the Lansing bill, by the terms of which corporations are to be taxed by this State only upon that portion of their capital stock which is employed within the boundaries of the State. This bill is the outcome of a successful action brought by the State Comptroller, and sustained by the Court of Appeals, levying a tax on the entire capital stock of the Western Union, the Gold and Stock and other telegraph companies, the greater portion of whose lines were outside of New York State.

Respecting custom-house appraisals, Secretary Manning writes in a letter to an officer in Philadelphia as follows: "There appears to be no good reason for the failure of the appraisers, either in Philadelphia or New York, to advance invoices of consigned goods which are unquestionably undervalued to equal at least the cost of production. The fact that a reduction of such advance might be made on appraisement, or that at some other port the same class of goods may be passed at a lower value, is not a valid reason to justify your failure to perform a plain official duty. It is not for you to assume that the importer will appeal from your action, or that, if he appeals, your action may be reversed on reappraisement. The law (Section 2902, Revised Statutes) makes it your duty to ascertain, estimate and appraise the true and actual market value and wholesale price of the merchandise at the time of exportation and in the principal markets of the country whence the same has been imported into the United States, and when it shall appear that such true and actual market value cannot be ascertained to your satisfaction you are to ascertain the cost of production, pursuant to the ninth section of the act of 1883 referred to, and in no case to appraise the goods at less than the cost so ascertained. These statutes are plain, and the appraisers must comply with and enforce them."

Hon. Joseph Chamberlain, before the Cobden Club, in London, on the 13th inst., said that, despite the exceptional depression in business, he ventured to state that England's general trade was more prosperous than that of any country in the world. Comparing the trade of England with that of America, Mr. Chamberlain read extracts from the report of Mr. McCulloch, recently

American Secretary of the Treasury, on American overproduction, and referred to the marked increase of failures in America as compared with the decrease in England, and quoted from a commercial agency's report on the reduction of wages to show the disadvantages of the protective system. The shipping trade, he said, was "almost entirely in the hands of English ship owners. The American iron trade is most heavily protected, yet there are in that country 80,000 unemployed ironworkers. The English boot and shoe trade is also increasing, and has driven American and French goods from every neutral market, the American traders being burdened by heavy duties on leather. Even in clocks and watches, which are considered indigenous to America, our exports to the United States nearly equalled the imports to England, while in the British colonies and elsewhere English goods are pushing American goods out of the markets."

The British ironclad Resistance, now lying at Devonport, will be plated with 16 inches of armor and then towed upon the mud, where a big Whitehead torpedo will be exploded against her, in order to test its destructive power.

The P. & O. Steam Navigation Company, one of the most important in England, will declare a dividend at the rate of 5 per cent. per annum, but they accompany the recommendation with the remark, as to the shipping business at large, that no tangible improvement can be recorded. The over-supply of tonnage may be reckoned by hundreds of thousands of tons.

A "canal union" is in course of formation in this city, with the object of enlarging the Erie Canal at a cost of \$3,000,000.

The New Orleans cotton merchants are said to be alarmed by the decline in local trade, caused by direct shipments of cotton from the interior to avoid port charges.

The twin-screw armor-belted English man-of-war Benbow was launched on the 15th inst. from the yard of the Thames Iron Works and Shipbuilding Company. The Benbow is by far the most powerful ironclad afloat, over 10,000 tons of metal having been used in her construction. She is built entirely of steel. Even her armor plates, which are 18 inches thick, have a facing of 6 inches of chilled steel, and many of them are of the weight of 10 tons. She is 330 feet long, 68 feet 6 inches beam, 37 feet deep, and has a displacement of 10,000 tons. Her engines are 9500 horse-power, and will, it is estimated, give her a speed of 17 1/2 knots per hour.

James Maire, a Frenchman who had for several years been employed as a boss machinist in the repair shop of the Sixth Avenue elevated railroad, was crushed to death on Monday by being caught between the platform and a moving locomotive.

Charleston, S. C., is said to be growing more rapidly than ever before.

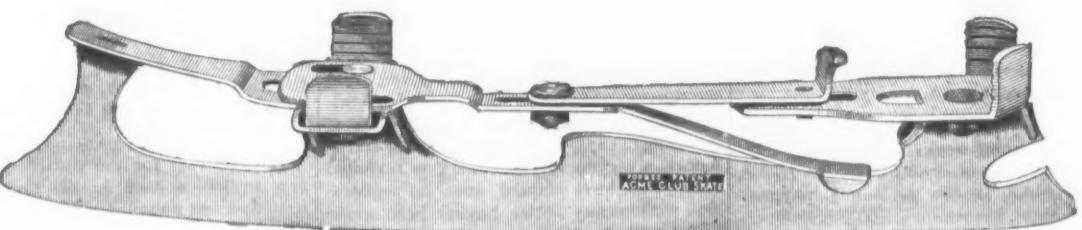
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Our XX High Pressure Hose is capable of sustaining the highest pressure of any system of water works, and is therefore most in demand for severe service. Our Standard Hose has capacity for and is successfully used where extraordinary pressure would seem to require the higher grade. The price being less, the largest demand for general use, therefore, is for Standard Hose. Plumbers' Hose is a brand originated by ourselves. For ordinary use it frequently answers as good a purpose as Standard, and, being cheaper, is therefore largely used. Competition Hose is the cheapest grade, but, being carefully and well made, answers a good purpose, and will do good service where water pressure is not strong.

We are in position to fill all orders promptly for the above grades of Hose, and in connection we supply all necessary attachments, including Couplings, Bands, Pipes, Nozzles, Hose Protectors, Reels, &c.

Our manufacturers also include all other kinds of Hose adapted to any use. These are described in our 32-page price list, which will be furnished on application, together with samples of Hose, Belting, Packing and other Rubber Goods.

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Stone  
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New Style  
Polishing Machine  
Boston, Mass.



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FOUNDRY CUPOLA,**

Made in six sizes, with capacity from one to fifteen tons per hour. Adapted to all classes of work, for light or heavy castings, and excels all others in Economy of Fuel and Iron. Address  
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Emery Wheels.  
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A SPECIALTY.  
POLISHING BELTS  
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**"LITTLE GIANT"**  
LABOR-SAVING TOOLS,  
FOR  
Blacksmiths' and Carriage-Makers' Use.



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OUR PRICES:  
3-16 Bit Brace Tap, Die and Collet, \$1.90.  
1-4 " " " 1.90.  
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MANUFACTURERS  
**Door Locks, Knobs,**  
BRONZE GOODS and BUILDERS' HARDWARE.  
Soft Small Gray Iron Castings a Specialty.  
CLEVELAND, OHIO, U. S. A.

## LATEST LEGAL DECISIONS.

## TRADE-MARK.

S. bought from Asher Bijar, of New York, the exclusive right to his trade mark, "La Normandie" or "Normandie," as a brand of cigars, and on finding that P. was using his trade mark the words "E. P. Normandie" or "Normandie," he required him to cease this use, and to account for profits made. P. refused to accede to these demands, and S. filed his bill in equity for relief. S. in using the trade-mark substituted on it his name (M. Stachelberg) and his initials (M. S.) for the name and initials of Bijar, and in this form the trade-mark was registered in 1876 under the act of Congress. In this case—*Stachelberg vs. Ponce*—brought in the United States Circuit Court, District of Maine, Judge Colt, in dismissing the bill, said: "The act of Congress under which registration was made has since 1876 been declared unconstitutional, and the complainant must stand on his common-law rights. In the use of the trade-mark the complainant does not state that it was obtained by assignment or purchase from A. Rijar, the originator, and upon whose manufacture the public relied for the quality of the cigars. A trade-mark must, either by itself or by association, point distinctively to the origin or ownership of the article to which it is applied. It imports that the article is made by the original proprietor, and therefore genuine, and the law protects the original proprietor, not only as a matter of justice, but to prevent imposition on the public. Now, in order that the public may not be deceived, it is essential that an assignee or purchaser of the original proprietor should indicate in the use of the trade-mark that he is the assignee or purchaser, otherwise the public is misled into purchasing the goods of another manufacturer or vendor as those of the original proprietor. The trade-mark of S. itself misleads, and he has no right to come here for relief."

## DIRECTOR AS AGENT OF BANK.

B. was a director in the Merchants' National Bank, Boston, and he procured therefrom a discount of the note of his firm for \$43,000, with the bills of lading for 155 hogsheads of sugar, the property of I. & Co., as security. The bills imported that the sugars were shipped by order of B.'s firm—in fact, they were consigned them for sale only. The president of the bank agreed to make the loan, and at the next meeting of the board of directors, B. being present, it was approved. It did not appear that B. took any part in the consideration of the loan. The owners of the sugars sued the bank for the conversion of their property, relying upon the point that the knowledge of the fraud of B. was chargeable upon the bank, through him, by his directorship. In this case—*Innerny vs. Merchants' National Bank*—the trial judge refused to charge the jury in favor of this point, and the bank had judgment. The plaintiff filed exceptions, which the Supreme Judicial Court of Massachusetts overruled. Judge Devens, in the opinion, said: "While the knowledge of an agent is ordinarily to be imputed to the principal, it would now appear to be well-established that there is an exception to the contraction or imputation of notice from the agent to the principal, in case of such conduct by the agent as raises a conclusive presumption that he would not communicate the fact in controversy, when the communication of such a fact would necessarily prevent the consummation of a fraudulent scheme the agent was engaged in consummating. Whether B. acted or not at the meeting of the directors in the matter of the loan, he could not lawfully have done so as the representative of the bank. His individual interest was distinctly antagonistic, and the question before the board related to its approval of a provisional transaction between himself and the president, in which he himself was the proposed borrower and the bank was to be the lender. A director offering a note of which he is the owner for discount, or proposing for a loan on collateral security alleged to be his own property, stands as a stranger to it. In the words of a distinguished English judge: 'That a joint-stock bank should have imputed to it the knowledge which the director has of own private affairs is a most unreasonable proposition.'"

## SAVINGS BANK—FRAUDULENT CREDIT GIVEN TO PREDECESSORS.

C. & Co. were private bankers, and as such gave B. a certificate of deposit. They made their business over to a savings bank which was duly incorporated, and the banking house was the former place of business of C. & Co. All of the members of C. & Co. were trustees of the bank, and one was president and the other secretary and treasurer, and these officers had full control of the transactions of the institution. These officers had given to C. & Co. an unauthorized credit on the books of the bank, and they took up the outstanding certificates of deposit of C. & Co., charged them to their account, canceling them with the bank's stamp, and issued for the amount of each the bank's certificates. B. surrendered his certificate and received that of the bank, and this latter certificate was from time to time renewed by the cashier. The fraudulent credit was discovered, and B.'s certificate was repudiated, and he sued the bank and recovered. The bank assigned error to the Supreme Court of Ohio, where the judgment in the case—*Citizens' Savings Bank vs. Blakesley*—was affirmed. Judge Owen, in the opinion, said: "The vital question upon which must rest the determination of the controversy is not one of the fraud or bad faith of the officers of the bank, but of their authority to act for and bind it. If C. & Co. had, in fact, had a cash credit at the bank, against which to charge the amounts of their certificates redeemed, would not this transaction have been utterly unassassable and the bank liable upon this certificate? It seems very clear to us that it would, and as we may treat the credit entries as genuine, in the absence of fraud or bad faith on the part of the plaintiff below, and as the subject of the transaction was within the course of the employment of the officers and of the business of the bank, we may safely rest our conclusion on this view. If the contract is within the authority of the officers, and would be valid and bind the bank under

any circumstances, an innocent party has the right to premise their existence and the bank is estopped to deny them. If the transaction properly pertain to the business of such association as this one, the fraud or bad faith of the managing officer constitutes no defense as against an innocent party. The fact that the cashier of the bank had been a member of the firm of C. & Co. ought not to limit or qualify his authority as cashier while dealing with an innocent party."

## The New Navy Ordnance.

The Ordnance Department of the Navy is making all possible effort to complete the batteries for the new cruisers by the time the vessels are ready to be put into commission. The clerical error in the last appropriation bill which deprived the department of an appropriation for this purpose will necessarily occasion some delay, but the majority of the guns can be completed in season. According to the *Army and Navy Journal*, they consist of four 8-inch breech-loaders, in half turrets; eight 6-inch and two 5-inch breech-loaders, for the Chicago; one 6-inch breech-loader for the Dolphin, and four 8-inch and six 6-inch each for the Boston and Atlanta. Of the 21 6-inch hooped breech-loading guns, five have been completed, six are being made under contract with the South Boston Iron Works, five with the West Point Iron Works, and five are being constructed by the workmen at the Washington Navy Yard. The steel forgings for all these guns are made by the Midvale Steel Company, of Philadelphia. Of the guns completed one has been tried, and is said to have stood a higher test than any similar gun ever manufactured. The designs for these guns, as well as all the others referred to in this article, were prepared by the Ordnance Bureau at the Navy Department. The weight of the 6-inch gun is 11,000 pounds. It is designed to carry a charge of 50 pounds and pro-

machine shops of all the other departments have been brought into use for ordnance work, and when all the men are actively engaged the scene in them is quite animated. The most interesting part of the work is in shrinking the jackets and hoops on the tube. When this work is in progress Commander Goodrich and his efficient assistants always have a crowd of interested spectators. This work of assembling the parts is accomplished by heating the jacket to a temperature sufficient to expand it to a size slightly greater than the tube. The utmost skill is necessary in calculating the shrinkage, so as to make the jacket of just sufficient size to pass over the tube when heated and to fit firmly when it cools. Too great a shrinkage would cause a strain on the metal, while, too little would prevent the jacket from fitting closely.

The removal of a jacket from its tube, which was recently made necessary with one of the 8-inch guns, is an interesting piece of work, requiring very skillful manipulation. The gun is so fixed that the molten metal can be poured around the jacket, the heat giving it an expansion sufficient to draw the tube out. Great care is taken to raise the tube from the jacket immediately after being loosened. A short delay would cause the tube to expand proportionately, making it impossible to

tools, &c., necessary to carry on the work of building the guns. Carriages for the guns are also being made. A great lathe is now being constructed for handling the two 10-inch guns. The jackets have been shrunk on these two guns, and when the lathe has been finished they will be pushed to completion as rapidly as possible.

## The Wear of Rails.

A correspondent of the *Railroad Gazette* brings out in a letter to that journal the following points affecting the wear on rails. Containing as it does many original arguments, and since it appears to be the result of close observation, it deserves the careful scrutiny of those who are inclined to decide in the laboratory what affects the quality of rails. The writer in question believes the wear to be very probably in accordance with the five following laws:

1. That wherever a rail receives more support vertically at one point than at

known that wherever a Wharton switch safety casting is used by the side of a rail the rail soon becomes bent outwardly at both ends of the castings, and no amount of lining and spiking will hold it in line. It is further noticeable that where planks are laid by the side of rails to make a road crossing, the rails are bent outwardly at both ends of the crossing. Also that the rail has more short kinks between guard-rail chairs than it has on curves where no guard-rail chairs are used.\* As illustrating the third law, we find that when joints are allowed to remain low a depression forms in the opposite rail over the tie in advance of the joint. We have reason to believe that where a new rail is placed on the outside of a curve depressions begin forming at once similar in character and nearly opposite to those already existing on the old rail on the inside of the curve. It is well to mention the low spot forming opposite to the point of frog. This law shows the necessity of true levels and the importance of having the track force so arranged as never to allow a joint to become low. As illustrating the fourth law, it is known that a joint allowed to remain low becomes deflected outwardly, and trial with a track gauge will show that the opposite rail has moved toward the joint. In other words, the track has moved laterally.

We know that the outer rail of double track wears faster than the inner. This is due to the support on the inner side of track being more regular. Rails wear faster in cuts than on banks, because little or no attention is paid to drainage, and it is impossible to give equal supports to rails unless drainage is perfect. As regards depression forming in the head of rail, they simply follow the well-known law that "a moving body changing its direction loses momentum." So if the rail deflects appreciably, laterally or vertically, the wheel changes direction in mounting the edge of tie and causes somewhat of a blow. The manner in which the spikes hold the rail to the tie, the width of the tie, the kind of ballast and the uniformity of material in the rail, will all be concerned in the length, depth and location of this depression. Sometimes it occurs over one edge of the tie, sometimes over the other, sometimes over the center of the tie, and sometimes it extends all over three places.

The tendency on American railways is toward heavier rails. It is quite probable that this will not prove the most economical way of increasing the life of rails. English roads use heavier rails than we do, and are said to obtain good service; but they also pay more attention to drainage and to the size of ballast. In other words, the character of the support is more nearly uniform than with us. Moreover, it is said that there is a tendency on the part of English roads to use lighter rails than formerly was the case. In the manufacture of large rails it is more difficult to obtain uniformity of material than it is with small ones. We can see in any rail mill that long after the base and web of rail have become black the head is still red. In other words, by the present method of manufacture the tension material (base) is hardest, while the compression is softest, taking longest to cool. The reverse should be true, and it is a debatable question whether it will not pay to arrange some form of oil or water bath through which to pass the head of rail as it comes from the rolls, and thus temper it to any desirable hardness. The great trouble with the American rail, and perhaps with that of English make of recent date, is that it wears so as to show a wavy appearance on top in the sunlight. It has been proposed to remedy this by using a heavier section. This will undoubtedly serve slightly to prevent this wear, in that it will lessen the deflection between ties, thereby preventing a changing of direction in the wheel.

However, suppose we are using pine cross-ties and found that the base of rail was cutting into the ties very badly. Should we in this case increase the size of ties or use a tougher timber? It seems to be a somewhat parallel case, when we find the rail wears in waves, principally because of lack of uniform material in the head, to strengthen them by increased section. I am inclined to think that with the same or softer material in the head of the rail the larger the head the softer the steel, other things being the same, the greater the depth of rail will be, and that it will be true economy to use a comparatively small rail of carefully made and tempered material. We know of a case in which a 56-pound English rail outlasted two 67-pound rails of American make, and is good to outlive another 67-pound American make.

## A New Oscillating Engine.

In view of the increased interest with which oscillating engines have of late been regarded in this country, our cuts illustrating a new form of this type brought out by Messrs. Moore Bros., of Boston, Mass., are worthy of attention. Simplicity, compactness, low cost and general efficiency are among the chief characteristics of the engine, which seems to be well designed to prove a serious rival of other low-cost engines now in the market and intended for comparatively light work.

Figs. 2 and 3 are perspective views showing its general arrangement, while Figs. 1 and 4 clearly illustrate the internal working mechanism, making detailed explanation unnecessary. It was the aim of the designer, Mr. E. L. Moore, to combine all the advantages of a good slide-valve engine with the acknowledged advantages of an oscillating cylinder, and at the same time turn out an engine capable of being run in either direction without the use of eccentrics, links or their connections. The principal feature of the design will thus be found in the distributing arrangement, the valve being of the ordinary U-form, and worked by the oscillations of the cylinder. In order to more clearly illustrate the method adopted we will suppose any point of the valve-rod to be connected by a small connecting-rod to a pin fixed on the center line of the trunnions, as at T in Fig. 4. This being the case the valve would remain in the

\* After the rail-head has worn down sufficiently for the wheel flange to strike the splice-bar, a hole wears in the side of the rail-head at the end of the flange-plate.

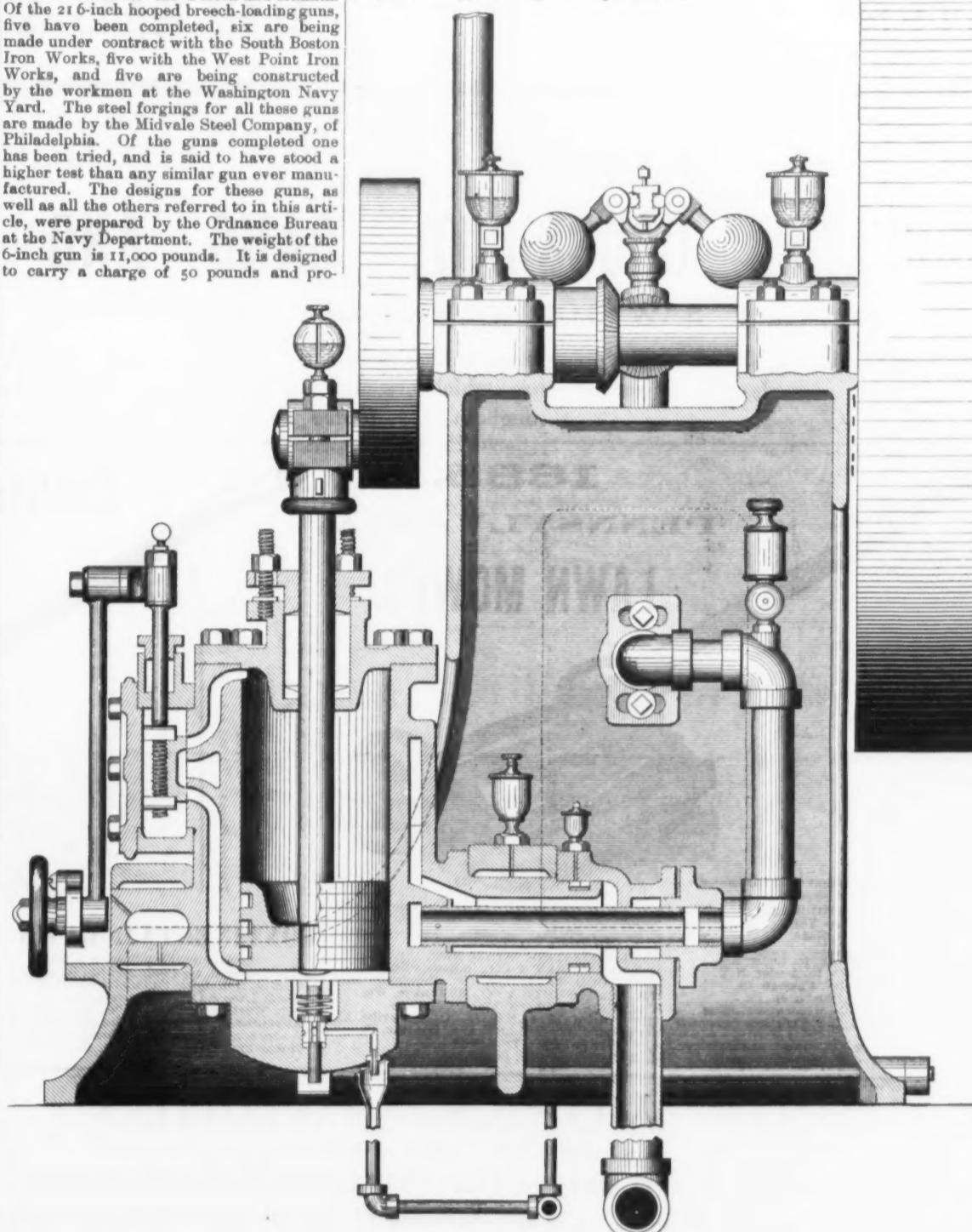


Fig. 1.—Longitudinal Section.

## A NEW OSCILLATING ENGINE, BUILT BY MESSRS. MOORE BROS., BOSTON, MASS.

jectile of 100 pounds; initial velocity, 2000 f. s. Of the 12 8-inch guns required, eight have been ordered and are under construction, four are being built at the Washington Navy Yard, and two each by the South Boston and West Point Iron Works. The 8-inch weighs 27,000 pounds; weight of projectile, 250 pounds; weight of charge, 125 pounds; initial velocity, 2000 f. s. In addition to those above mentioned, the two 5-inch guns for the Chicago and the two 10-inch guns for the Miantonomah are being made at the Washington Navy Yard. The weight of the 5-inch 30 cal. is 5800 pounds; charge, 30 pounds, and projectile, 60 pounds; initial velocity, 2000 f. s. One of these guns will be of 26 cal., and will weigh 4200 pounds. The 10-inch gun weighs 53,000 pounds; charge, 250 pounds; projectile, 500 pounds; initial velocity, 2000 f. s. The tube for the 10½-inch gun will shortly be ordered. The tube for the 12-inch gun will not be contracted for until another appropriation has been made. The 10½-inch gun is designed to weigh 62,000 pounds, and will carry a projectile of 550 pounds, with a powder charge of 275 pounds. The 12-inch gun will weigh 44 tons; charge, 425 pounds; projectile, 850 pounds; initial velocity, 2000 f. s. A 6-inch wire-wound gun is being constructed as an experiment. Its weight is 10,500 pounds; weight of projectile, 100 pounds; charge, 50 pounds; initial velocity, 2000 f. s.

The Washington Navy Yard is now one of the busiest places in the country, and to ordnance people one of the greatest interest. The shops in this yard employ 270 men, which is probably more than one-half of the whole number employed in the yard. The

draw the jacket from it. The steel tubes, jackets and hoops for the smaller calibers were all furnished by the Midvale Steel Company. The tubes and jackets are rough turned and bored at the yard, and then returned to the Midvale Steel Company for oil tempering for the purpose of raising the metal up to the standard. After the tubes and jackets have been tempered, and specimens from them tested and approved, they are again sent to the navy yard, where they are fine-bored and fine-turned, preparatory to assembling with the other parts of the gun, many of which are tempered at the yard. This process consists of immersing the steel at a cherry heat in a bath of oil, and there allowing it to cool. For this purpose there is at the navy yard a tank sunk in the ground about 17 feet deep, with a diameter of 5 feet, and holding 1000 gallons of oil. It is necessary to have the liquid in which the steel is immersed at a low temperature, and to this end the tank is constructed with a 5-inch space around the inner tank, through which water circulates. Sperm oil was at first used, but cotton-seed oil is now substituted, as it is much cheaper and answers the purpose equally well. On cooling, the steel is tested to ascertain the tensile strength, elasticity and extension, and it is often necessary to repeat the process or to anneal it. The annealing process consists in burying the metal in a tank filled with sand, under which a fire is built and banked, and the whole allowed to cool. When the steel is taken out it possesses increased ductility.

In addition to the construction of these guns, much work has been and is being done at the yard in the way of making machinery

another a depression in the head of rail forms over or near the additional support. Of this depression the length, depth and exact location as regards the support are determined by the uniformity of material in the rail as well as by the ballast used and the facility for draining the road-bed.

2. That wherever the rail receives more support laterally at one point than at another the wear on the rail near this point is greatest and the rail is deflected outwardly on both sides of the support.

3. A low spot on one rail causes the formation of a low spot on the opposite rail just in advance of the original low spot (double track).

4. Where the wheel encounters a low spot on one rail it tends to move the track in the direction of that spot laterally.

5. The outer rails of the outer track wear faster than the inner ones, and all rails wear faster in cuts than on banks.

Theoretically, these laws are objectionable. As illustrating the first law practically, trial with a straight-edge or with a micrometer screw, if preferred, will show that a depression in the head of the rail exists over many cross-ties, but very seldom between them. Occasionally we find the head of the rail lower between ties than over them, but in such cases the straight-edge applied to the upper surface of the rail flange will show that the rail is bent between ties, and not compressed. It will also be found that a depression exists over or near nearly every guard-rail chair, partly due to the support afforded by the tie, and partly to that of the guard-rail chair, but it is found to be greater where the chair is used than where it is not. As illustrating the second law, it is quite well

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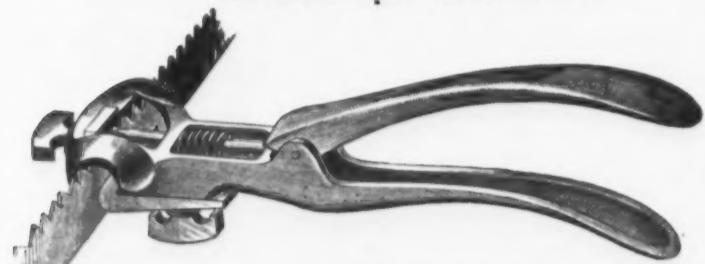
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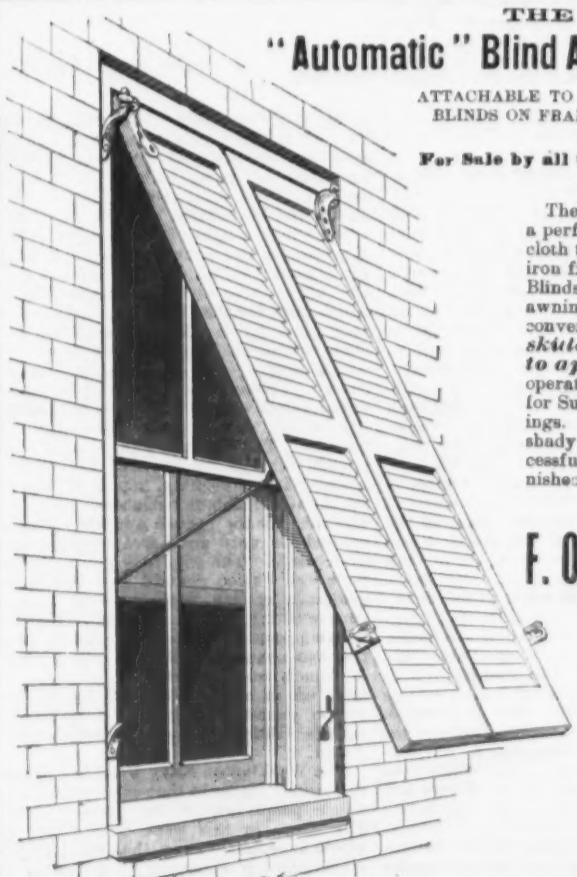
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same position relative to the steam ports, notwithstanding the oscillations of the cylinder, the fixed point *d* on the valve-rod describing the arc *e* *e'*. If, however, the lower pin be moved to one side and held there, as, for example, to *a* or *b*, the point *d* will describe the arc *f* *g* or *g* *f*, as the case may be, and the engine will run in the direction in which the lower pin has been moved. Reversing may consequently be effected by turning the small hand-wheel at the lower end of the cylinder, shown in Figs. 1, 2 and 3. By means of a segmental rack-

capacity of the new steel plant will be 40 tons per day greater than the present capacity of the nail works, but it is the purpose of the company to increase the nail-cutting department. This will require a total of 231 nail machines, being 78 more machines than are now in operation. The Western Nail Company have already achieved a high reputation for their wonderfully large production of nails. In the year ended June 1 they made 342,434 kegs.

It has been very widely reported that

Chese, Cook & Co., of Pittsburgh, have

are earnestly considering the advisability of adding steel plants to their iron works. In some cases the only matter to be settled is the process to be adopted.

In the East number of owners of iron works will add steel plants of various kinds during the year. The Cedar Point Iron and Steel Company, of Port Henry, N. Y., has contracted for the erection of a Clapp-Griphiths plant to be operated in connection with their blast furnace, being first in this country to take this new departure. The Pottstown Iron Company are erecting a build-

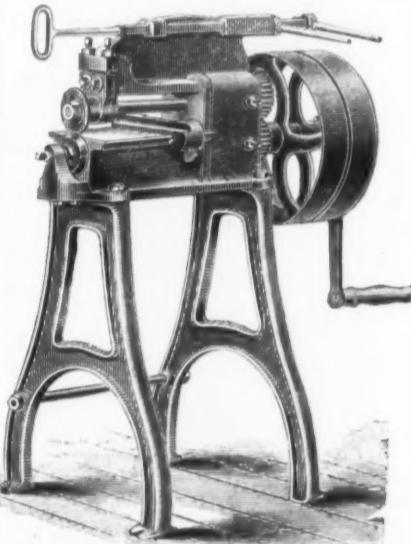
this section at a lower rate than that at which steel can be converted, owing to the lower wages paid to rolling-mill employees in the East as compared with those paid in the West, where steel is produced more cheaply than iron in certain lines of products. Hence the tendency to add steel plants to Eastern iron works is thus far not specially remarkable.—*Bulletin*.

**Iron vs. Steel for Locomotive Fire Boxes.**—The *National Car Builder* for June contains the following extract regarding the

parts of the machinery. Lately Mr. Bushnell, master mechanic of the Burlington, Cedar Rapids and Northern Railway, has experimented with iron side sheets for fire-boxes, trying to find out their relative strength and durability, when subjected to the deteriorating influence of bad water, compared with steel. In the fire-boxes of several engines he put in one side sheet of Tennessee iron and one side sheet of Otis steel. The engines so fitted up have done considerable hard service, and the iron has stood so well that the intention now is to put in a whole fire-box of that material. With the steel fire-boxes so far there has been much trouble experienced with cracking from the stay-bolts. The cracks have seldom extended far, but they soon become so numerous that the leakage would be serious.

#### Rotary Slitting Shears.

The accompanying engraving represents a new form of power rotary slitting shears recently brought out by the Niagara Stamping and Tool Company, Buffalo, N. Y. This company are making several sizes of the shears shown which are adapted for different purposes. They recommend them for slitting sheet iron, brass, copper, tin plate and galvanized iron up to No. 12 gauge. While these machines are primarily calculated to run by power, in addition to pulleys, they are provided with a crank, so that they can be turned by hand. It is asserted that No. 12 iron is readily cut in this manner. Reels for winding and unwinding rolled brass are supplied as an attachment when required. This style of shears is recommended by the makers for use in cornice shops where the cost of an 8-foot squaring shears could not be



New Rotary Slitting Shears, Manufactured by the Niagara Stamping and Tool Co., Buffalo, N. Y.

afforded. The machine shown has a depth of throat of 16 inches, so that it will slit the 30-inch sheets in the center. The general construction of the machine is readily understood by the engraving. Its parts are simple and so arranged as not likely to get out of order.

#### The Use of Natural Gas.

The following new rules in regard to the use of natural gas in manufacturing establishments have been adopted by the Pittsburgh Local Board of Fire Underwriters:

1. That when gas is to be introduced into any premises a tank governor or regulator shall be placed as remote as possible from the building, by which the pressure shall be reduced to not exceeding 2 pounds.

2. A safety-valve shall be placed between the governor or regulator and buildings, which will blow off when the pressure exceeds 2 pounds.

3. A mercury gauge must be placed inside of buildings which will indicate the exact pressure in the pipes.

4. All pipes leading from the regulator and into the mills shall be of as large diameter as possible, and all pipes on entering a building shall be elevated and carried overhead and above all furnaces and boilers.

5. All pipes, valves and fittings shall be carefully inspected, when the work is completed, by the secretary of this board before the privilege is given to use natural gas.

The fire marshal and secretary of the board are required to examine all premises where the use of natural gas is desired, and where the requirements are complied with a certificate is issued to the insured to the effect that the arrangements for the use of gas are in accordance with the regulations of the board. The new rules reduce the maximum pressure of gas 1 pound below that fixed by the first rules which were adopted in August.

A new mode of finishing scissors and shears forms the subject of a patent issued to D. Wheeler, of Bridgeport, Conn. The object of the invention is to save the expense of first grinding, then plating and finally polishing the entire surface of the shears. The inventor casts parts of the surfaces roughly, preferably the exterior of the bows. These parts are plated as they come from the molds—that is, without grinding or polishing. They then require no buffing or polishing, but represent a frosted appearance, which is said to be less expensive than polished work and to command a higher price in the market.

The blast furnace of Perkins & Co., at Sharpsville, is doing remarkable work. During the month of April an average product of nearly 100 tons per day was obtained, the coke consumed per ton of pig produced being 2235 pounds. This is the lowest fuel consumption we have any positive information of. This furnace is 14-foot bosh, 65 feet high, and has but one 72-inch blowing engine.

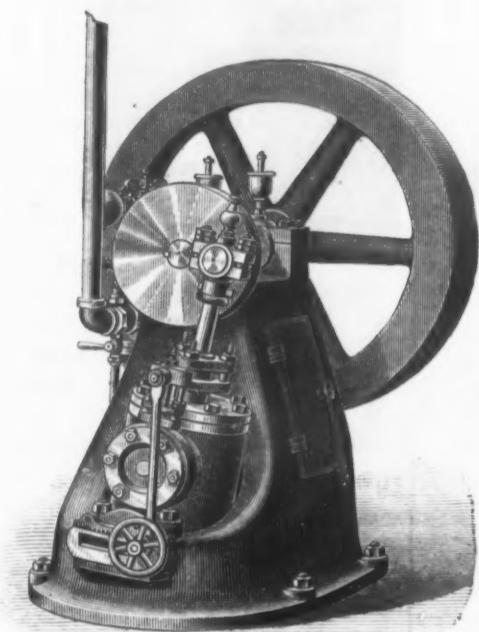


Fig. 2.—Perspective View.

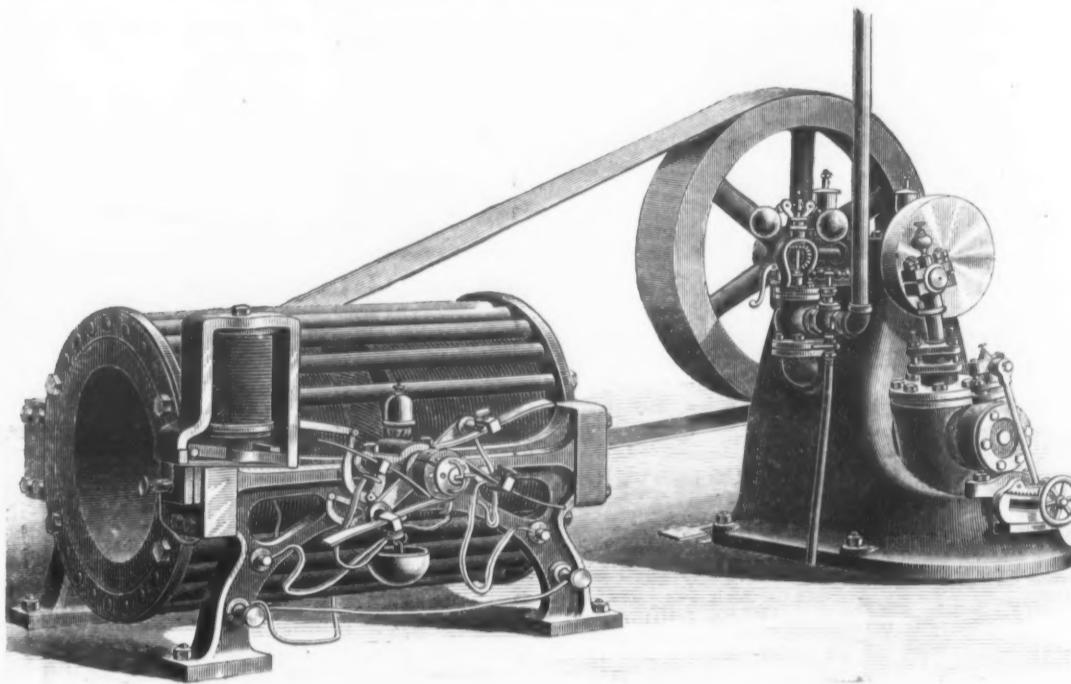


Fig. 3.—Perspective View of Engine Connected with Dynamo.

A NEW OSCILLATING ENGINE, BUILT BY MESSRS. MOORE BROS., PORTSMOUTH, OHIO.

and-pinion arrangement this throws the center of oscillation of the small connecting-rod from one side of the center line of the trunnions to the other at the will of the attendant. This feature of the valve motion is specially applicable to elevator work and all classes of work requiring a frequent change in direction of motion. From Fig. 1 it will be seen that live steam after having passed through the governor-valve is led to the center of the inside trunnion. Here it enters brass tube concentric with the trunnion, and after passing through this it is carried around the cylinder and into the steam-chest. The exhaust steam passes from the valve port around the opposite side of the cylinder and out through the back trunnion through a channel formed around the live-steam pipe. By leading steam and exhaust through one trunnion in this manner only one stuffing-box is necessary. An unusually large stuffing-box around the piston-rod, together with a well-fitting piston, gives a sufficiently long bearing to insure satisfactory behavior. The lower end of the cylinder is fitted with a relief-valve for water of condensation. This valve is furnished with a spring holding it against its seat, and is worked by a treadle arranged in the manner shown. Taken altogether, the engine embraces a number of valuable features which will no doubt be duly appreciated.

#### New Steel Works in the United States.

Contracts have been made for the erection of a Bessemer steel plant at Mingo Junction, Ohio. It will be operated by the Junction Iron Company and the Laughlin Nail Company, Samuel Laughlin being president of the former company, and his brother Alexander of the latter. The plant is to be completed in September next. Its location will be near the blast furnaces of the Junction Iron Company, which will make the Bessemer pig iron needed. A part of the equipment, embracing two 5-ton converters, three 8-foot cupolas, a 34-inch reversible blooming mill with hydraulic tables and lifting apparatus, a pair of 28 x 58 reversing engines, and blowing engines with 34-inch steam and 48-inch air cylinders and 5-foot stroke, will be built by McIntosh, Hemphill & Co., of Pittsburgh, with C. Amsler, M. E., late of the Riverside Iron Works, in charge of the construction and supervision. Eight Holley cranes will be built by Morgan, Williams & Co., of Alliance, Ohio. Twelve boilers and an iron building 80 x 150 feet, for converting department, engine and ganister houses, &c., will be supplied by Ritter, Conley & Co., of Pittsburgh. Four duplex pressure pumps will be from Epping, Carpenter & Co. The hydraulic apparatus, pipes, valves, &c., will be furnished by Atwood & McCaffrey. The daily capacity will be 300 tons of nail slabs. The two companies, whose offices are at Wheeling, W. Va., though their works are in Ohio, are extensive manufacturers of nails, and they expect their joint product of steel nails to be 2500 kegs daily when their arrangements are completed. The erection of the new steel plant will involve an expenditure of \$260,000.

The Western Nail Company, of which Gen. W. H. Powell is president, have contracted with James P. Witherow, of Pittsburgh, for the erection of a Clapp-Griphiths steel plant at Belleville, Ill. The building will be constructed entirely of iron, and its dimensions will be 90 x 120 feet, divided into two compartments. In one compartment will be contained a hydraulic metal hoist, two cupolas with provision for an additional one when required, two 3-ton converters, two 10-inch hydraulic rams to elevate bottoms, and the necessary hydraulic cranes for handling ladles, ingots, &c. In the other compartment will be the boilers, blowing engines, cupola blowers, pumps and accumulators, repairing-room, &c. The cost of this steel plant, fully equipped for producing 125 tons of steel ingots per day of 24 hours, is estimated at \$75,000. The ca-

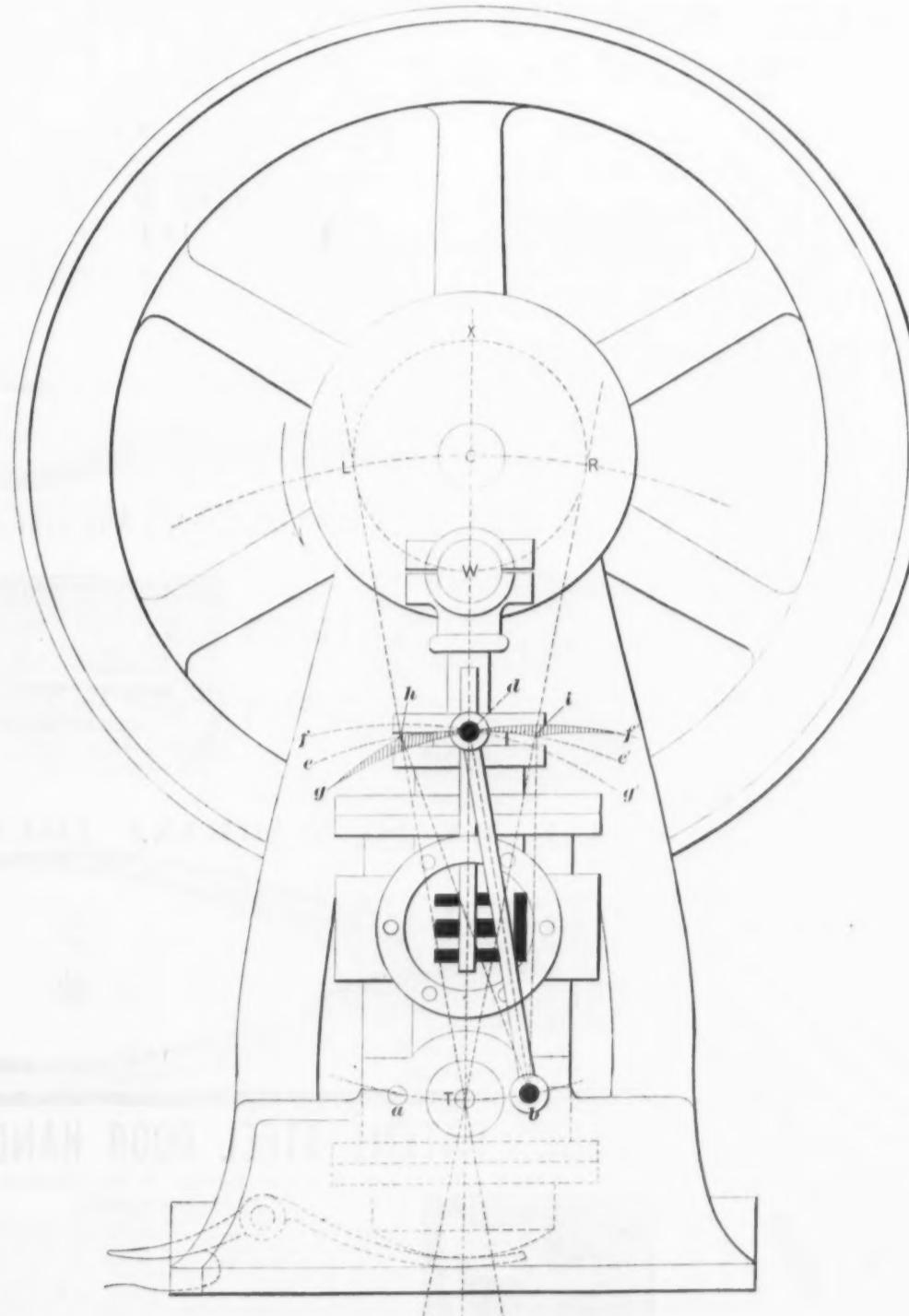


Fig. 4.—Elevation, Showing Arrangement of Valve Gear.

ent. They will build a mill for rolling steel plates for nails, but they propose to buy the necessary steel slabs until next season, when they may decide to erect converters.

Mr. A. S. Snedenberger & Co., owners of the Juniata Iron and Steel Works, at Pittsburgh, are erecting a Bessemer steel plant, of which we are promised a complete description when the work of erection has made greater progress. Other iron manufacturers at Pittsburgh, Wheeling, and points further West

making processes with a view to the adoption of the most suitable one for their purpose. Other Eastern parties are making inquiries concerning the cost of building steel works, but have not yet decided to enter upon the work of erection.

The steel question in the East is on a different footing from that in the West. Here it appears to be a question of quality of product rather than of cheapening the cost of manufacture. Iron can still be worked in

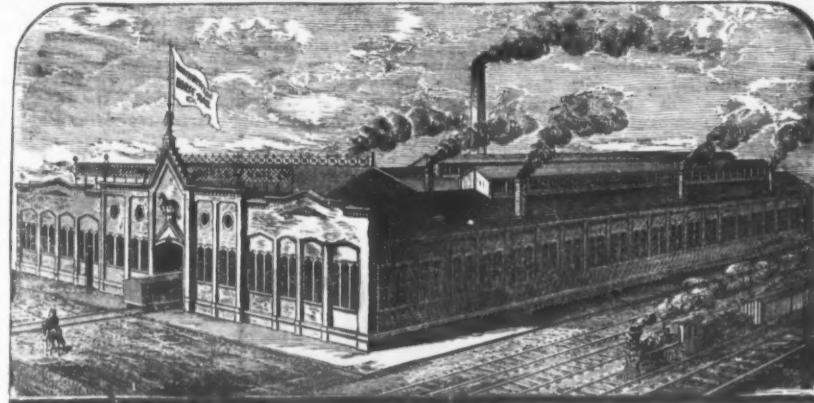
way shops, at Cedar Rapids, Iowa., have turned out 17 locomotives that have undergone extensive repairs. Of these, two have had new fire-boxes and 11 of them new side sheets. People using the soft water common in the Eastern States have no conception of the great increase in the expense of locomotive repairs caused in the Western States by bad water. On some roads the expense of maintaining boilers and fire-boxes is greater than the expense of maintaining all other

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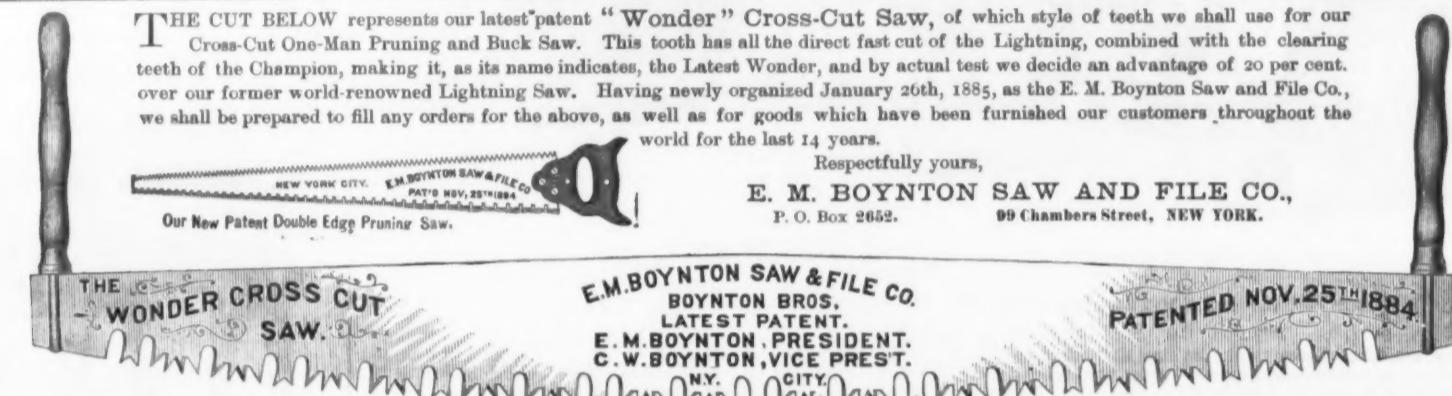


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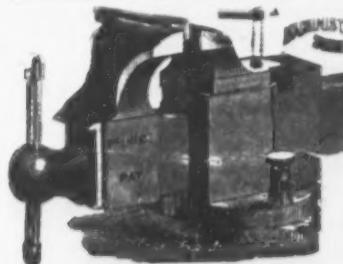
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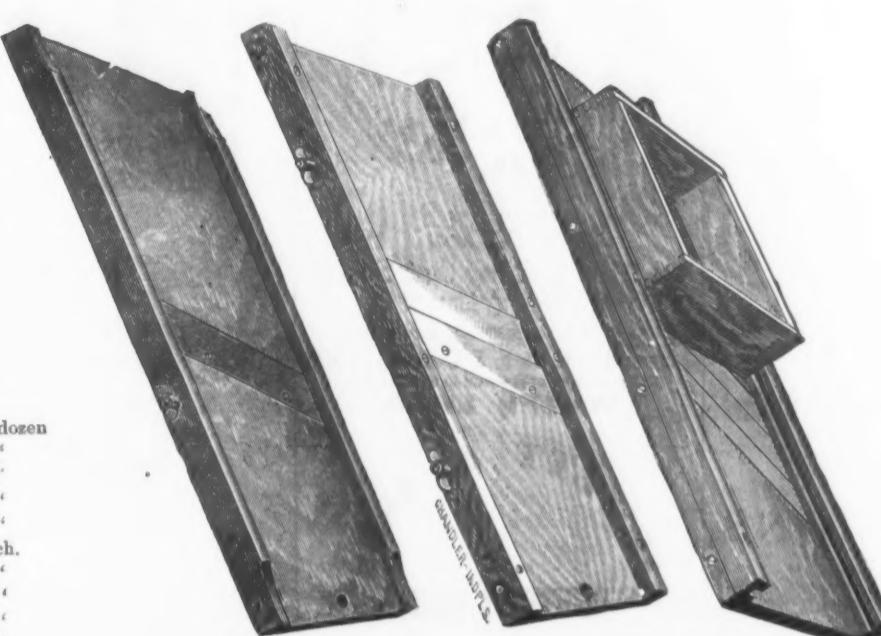
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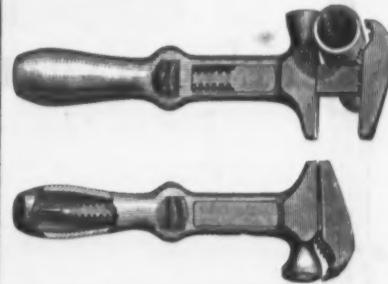
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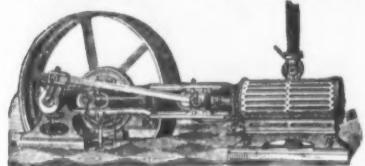
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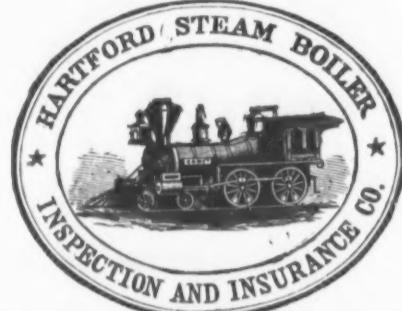


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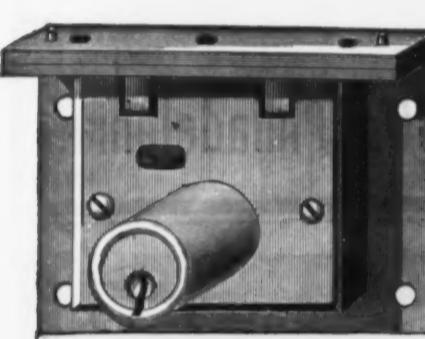
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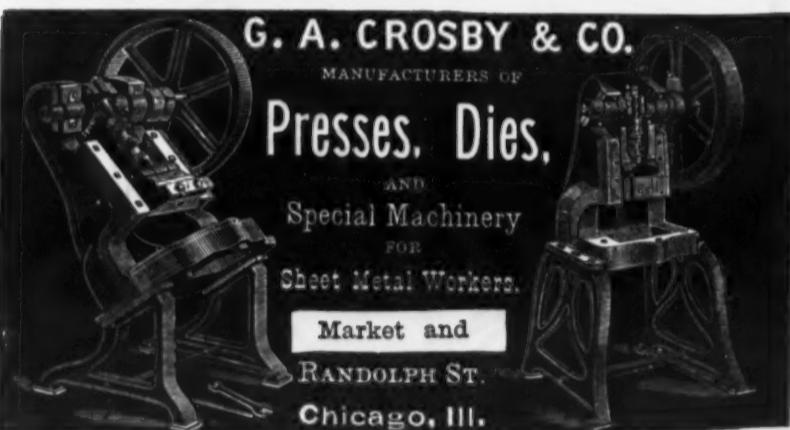
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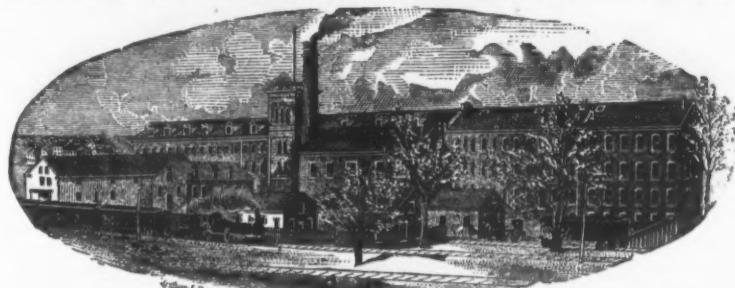
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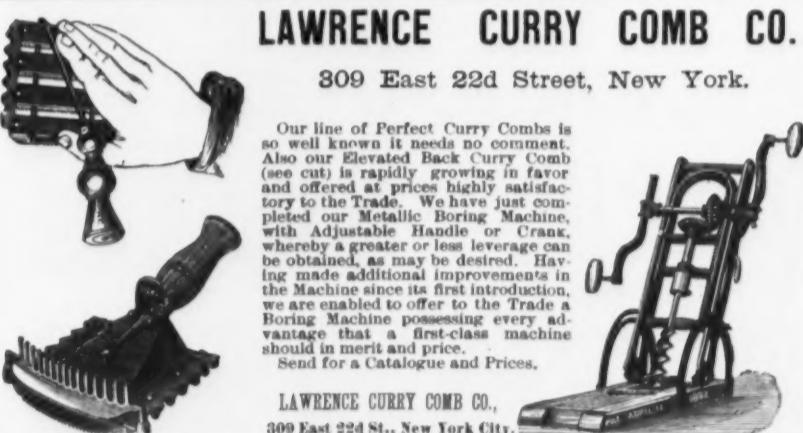
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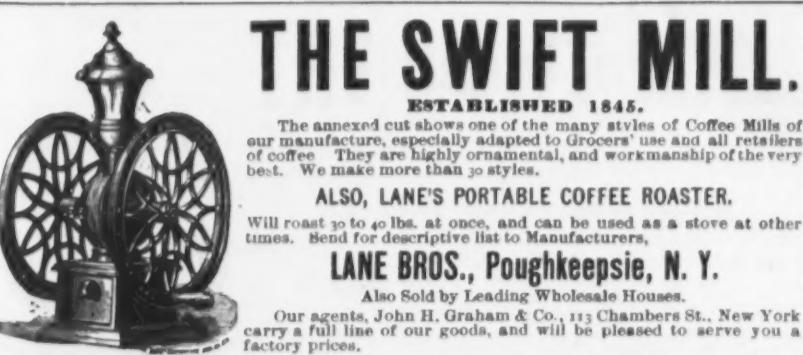
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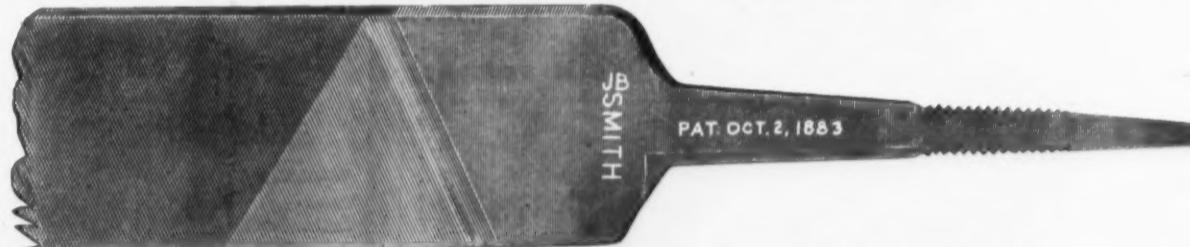
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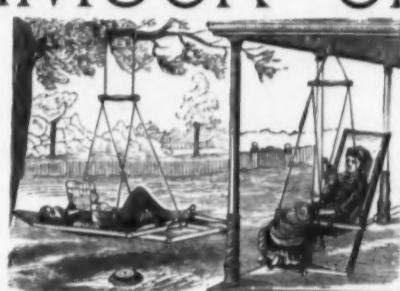
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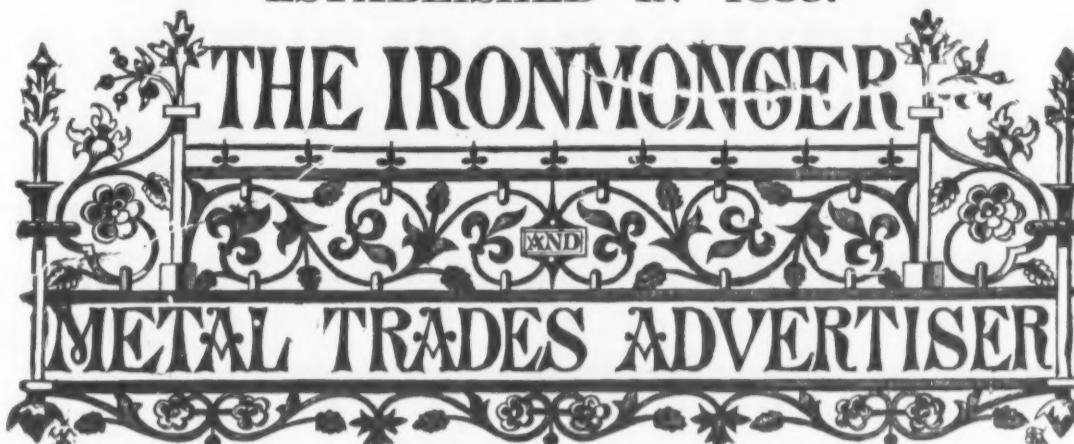
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THE OLDEST AND CHIEF REPRESENTATIVE OF THE IRON, HARDWARE AND METAL TRADES.

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JUNE 20, JULY 18, AUGUST 15, SEPTEMBER 5, OCTOBER 3 and 31, NOVEMBER 28, DECEMBER 26, 1885, JANUARY 23, FEBRUARY 20, MARCH 20, APRIL 17, and MAY 15, 1886. This supplement is published in

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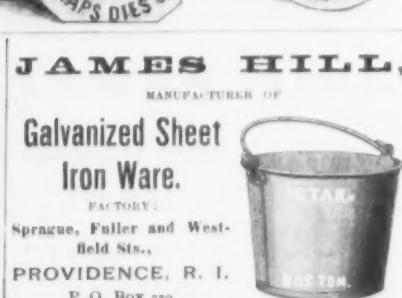
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so far as our experience of more than twenty years is concerned, will be covered by *The Foreign Supplement* at least twice a year. Thus a Price List or Advertisement inserted in the *Ironmonger* and *Foreign Supplement* is a strikingly powerful and most efficient way of publicity, not to be compared with any of the other ordinary channels of communication.



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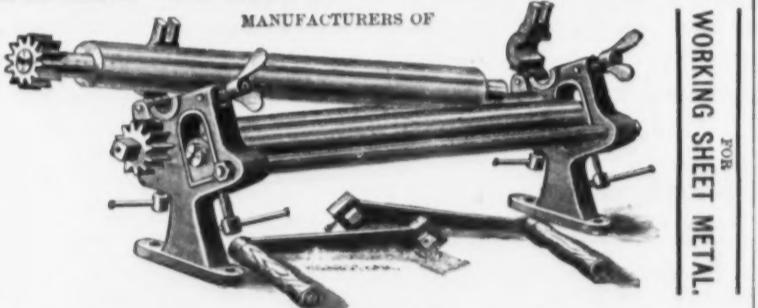
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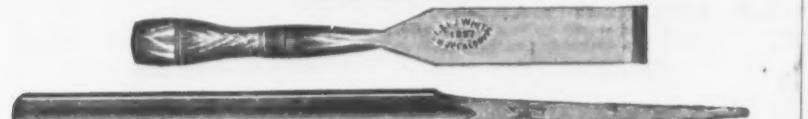
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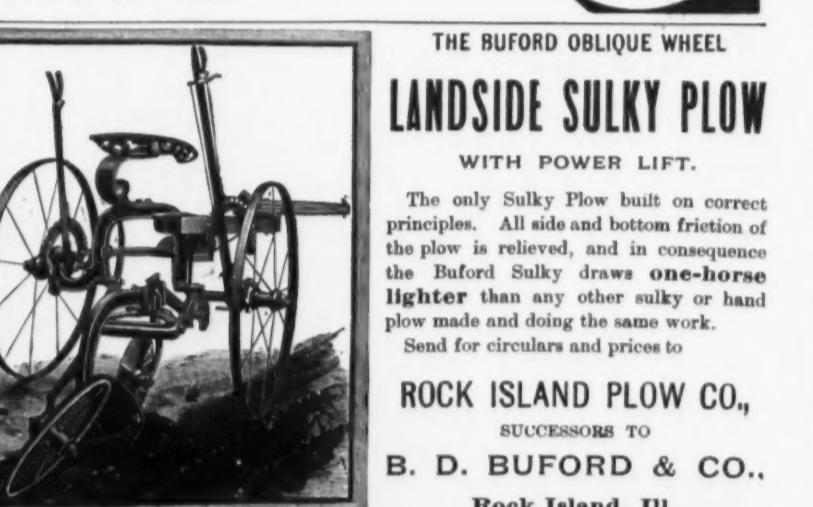
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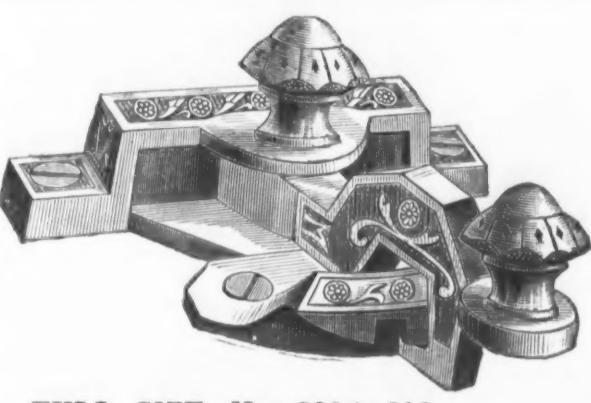
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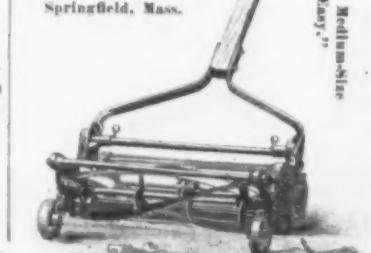
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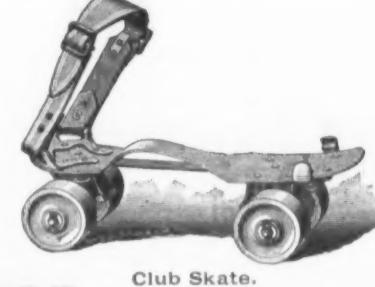
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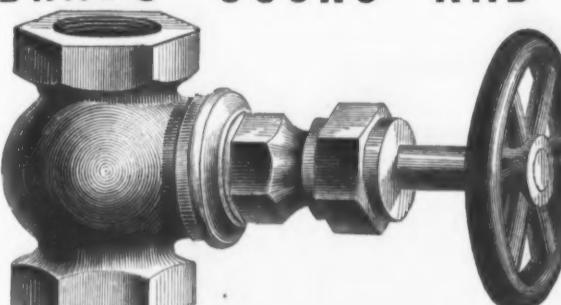
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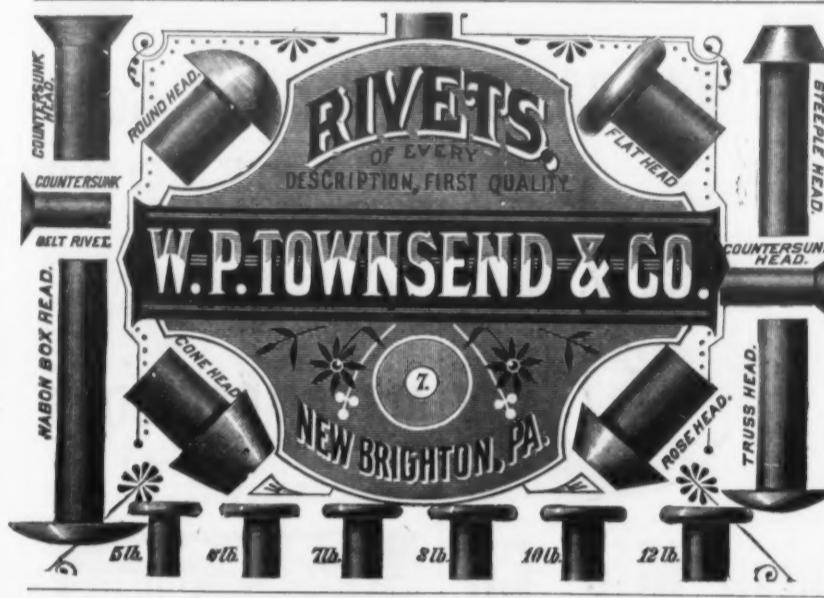
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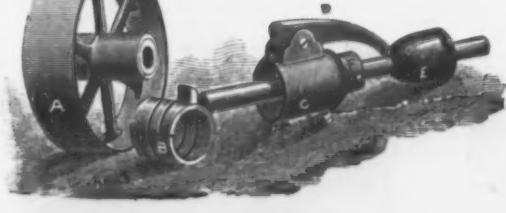
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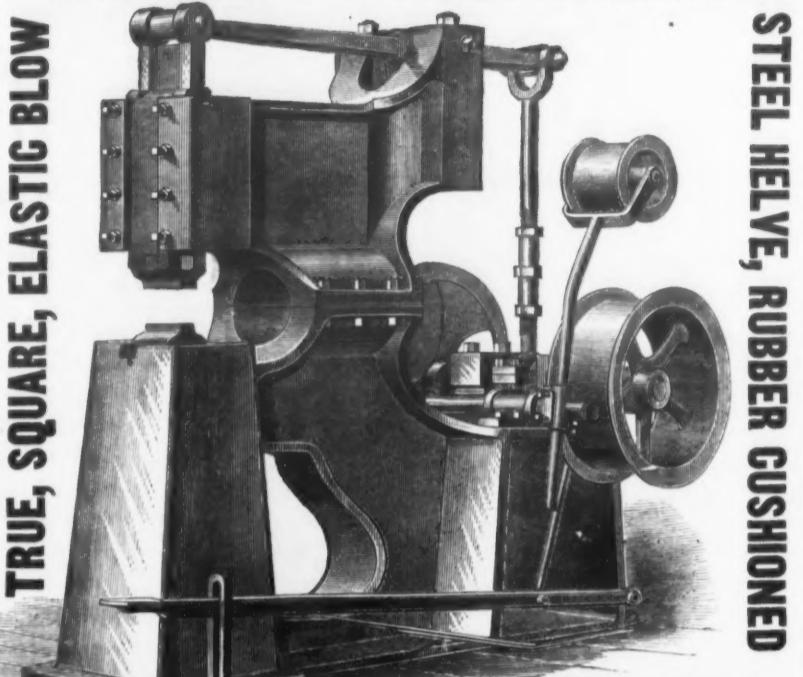
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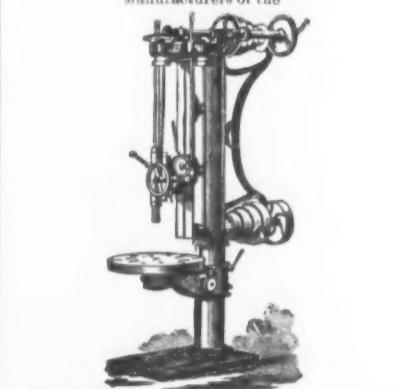
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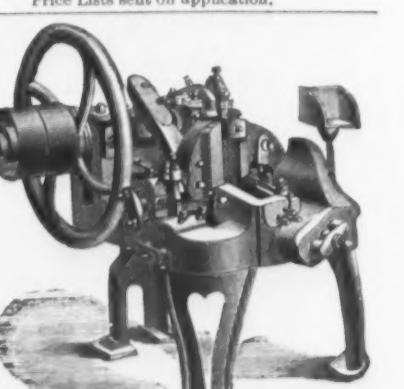
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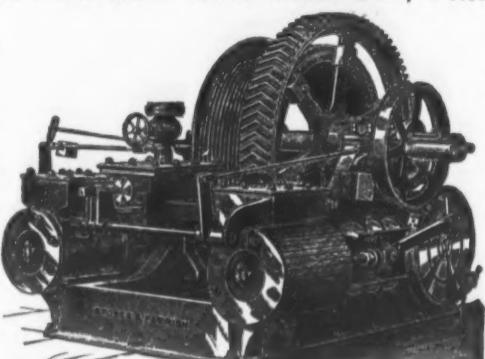
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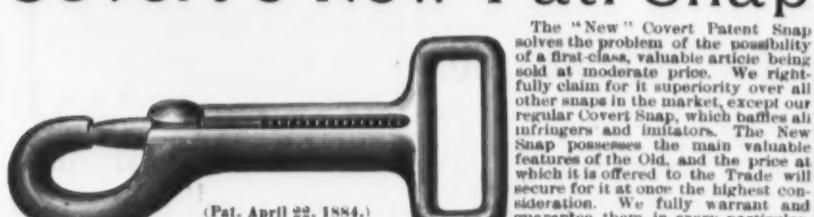
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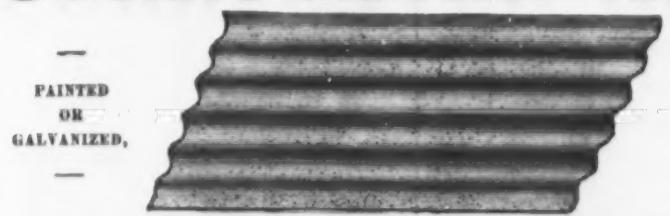
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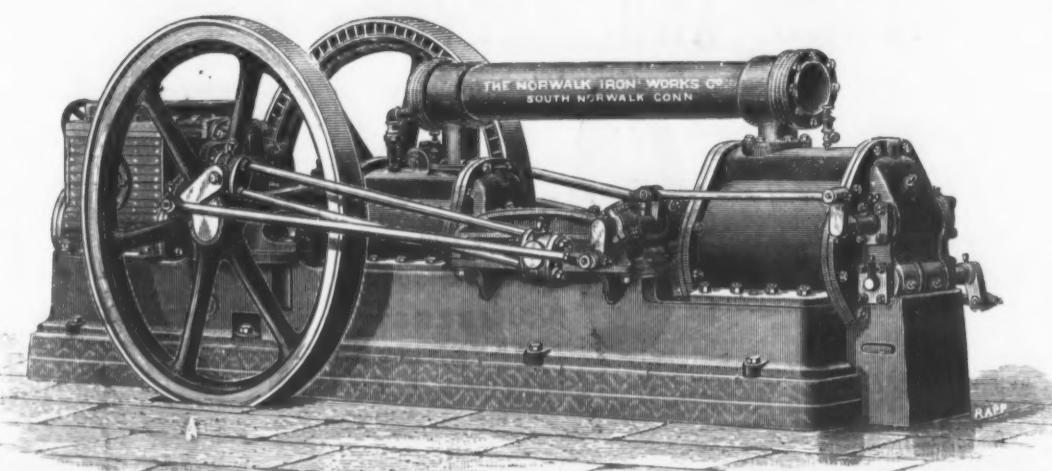
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This Cupola has made a great revolution in melting iron. It differs from all others in having a CONTINUOUS TUYERE—or, in other words, the blast enters the fuel at all points. Above one ton capacity per hour, they are made in 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105, 110, 115, 120, 125, 130, 135, 140, 145, 150, 155, 160, 165, 170, 175, 180, 185, 190, 195, 200, 205, 210, 215, 220, 225, 230, 235, 240, 245, 250, 255, 260, 265, 270, 275, 280, 285, 290, 295, 300, 305, 310, 315, 320, 325, 330, 335, 340, 345, 350, 355, 360, 365, 370, 375, 380, 385, 390, 395, 400, 405, 410, 415, 420, 425, 430, 435, 440, 445, 450, 455, 460, 465, 470, 475, 480, 485, 490, 495, 500, 505, 510, 515, 520, 525, 530, 535, 540, 545, 550, 555, 560, 565, 570, 575, 580, 585, 590, 595, 600, 605, 610, 615, 620, 625, 630, 635, 640, 645, 650, 655, 660, 665, 670, 675, 680, 685, 690, 695, 700, 705, 710, 715, 720, 725, 730, 735, 740, 745, 750, 755, 760, 765, 770, 775, 780, 785, 790, 795, 800, 805, 810, 815, 820, 825, 830, 835, 840, 845, 850, 855, 860, 865, 870, 875, 880, 885, 890, 895, 900, 905, 910, 915, 920, 925, 930, 935, 940, 945, 950, 955, 960, 965, 970, 975, 980, 985, 990, 995, 1000, 1005, 1010, 1015, 1020, 1025, 1030, 1035, 1040, 1045, 1050, 1055, 1060, 1065, 1070, 1075, 1080, 1085, 1090, 1095, 1100, 1105, 1110, 1115, 1120, 1125, 1130, 1135, 1140, 1145, 1150, 1155, 1160, 1165, 1170, 1175, 1180, 1185, 1190, 1195, 1200, 1205, 1210, 1215, 1220, 1225, 1230, 1235, 1240, 1245, 1250, 1255, 1260, 1265, 1270, 1275, 1280, 1285, 1290, 1295, 1300, 1305, 1310, 1315, 1320, 1325, 1330, 1335, 1340, 1345, 1350, 1355, 1360, 1365, 1370, 1375, 1380, 1385, 1390, 1395, 1400, 1405, 1410, 1415, 1420, 1425, 1430, 1435, 1440, 1445, 1450, 1455, 1460, 1465, 1470, 1475, 1480, 1485, 1490, 1495, 1500, 1505, 1510, 1515, 1520, 1525, 1530, 1535, 1540, 1545, 1550, 1555, 1560, 1565, 1570, 1575, 1580, 1585, 1590, 1595, 1600, 1605, 1610, 1615, 1620, 1625, 1630, 1635, 1640, 1645, 1650, 1655, 1660, 1665, 1670, 1675, 1680, 1685, 1690, 1695, 1700, 1705, 1710, 1715, 1720, 1725, 1730, 1735, 1740, 1745, 1750, 1755, 1760, 1765, 1770, 1775, 1780, 1785, 1790, 1795, 1800, 1805, 1810, 1815, 1820, 1825, 1830, 1835, 1840, 1845, 1850, 1855, 1860, 1865, 1870, 1875, 1880, 1885, 1890, 1895, 1900, 1905, 1910, 1915, 1920, 1925, 1930, 1935, 1940, 1945, 1950, 1955, 1960, 1965, 1970, 1975, 1980, 1985, 1990, 1995, 2000, 2005, 2010, 2015, 2020, 2025, 2030, 2035, 2040, 2045, 2050, 2055, 2060, 2065, 2070, 2075, 2080, 2085, 2090, 2095, 2100, 2105, 2110, 2115, 2120, 2125, 2130, 2135, 2140, 2145, 2150, 2155, 2160, 2165, 2170, 2175, 2180, 2185, 2190, 2195, 2200, 2205, 2210, 2215, 2220, 2225, 2230, 2235, 2240, 2245, 2250, 2255, 2260, 2265, 2270, 2275, 2280, 2285, 2290, 2295, 2300, 2305, 2310, 2315, 2320, 2325, 2330, 2335, 2340, 2345, 2350, 2355, 2360, 2365, 2370, 2375, 2380, 2385, 2390, 2395, 2400, 2405, 2410, 2415, 2420, 2425, 2430, 2435, 2440, 2445, 2450, 2455, 2460, 2465, 2470, 2475, 2480, 2485, 2490, 2495, 2500, 2505, 2510, 2515, 2520, 2525, 2530, 2535, 2540, 2545, 2550, 2555, 2560, 2565, 2570, 2575, 2580, 2585, 2590, 2595, 2600, 2605, 2610, 2615, 2620, 2625, 2630, 2635, 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3470, 3475, 3480, 3485, 3490, 3495, 3500, 3505, 3510, 3515, 3520, 3525, 3530, 3535, 3540, 3545, 3550, 3555, 3560, 3565, 3570, 3575, 3580, 3585, 3590, 3595, 3600, 3605, 3610, 3615, 3620, 3625, 3630, 3635, 3640, 3645, 3650, 3655, 3660, 3665, 3670, 3675, 3680, 3685, 3690, 3695, 3700, 3705, 3710, 3715, 3720, 3725, 3730, 3735, 3740, 3745, 3750, 3755, 3760, 3765, 3770, 3775, 3780, 3785, 3790, 3795, 3800, 3805, 3810, 3815, 3820, 3825, 3830, 3835, 3840, 3845, 3850, 3855, 3860, 3865, 3870, 3875, 3880, 3885, 3890, 3895, 3900, 3905, 3910, 3915, 3920, 3925, 3930, 3935, 3940, 3945, 3950, 3955, 3960, 3965, 3970, 3975, 3980, 3985, 3990, 3995, 4000, 4005, 4010, 4015, 4020, 4025, 4030, 4035, 4040, 4045, 4050, 4055, 4060, 4065, 4070, 4075, 4080, 4085, 4090, 4095, 4100, 4105, 4110, 4115, 4120, 4125, 4130, 4135, 4140, 4145, 4150, 4155, 4160, 4165, 4170, 4175, 4180, 4185, 4190, 4195, 4200, 4205, 4210, 4215, 4220, 4225, 4230, 4235, 4240, 4245, 4250, 4255, 4260, 4265, 4270, 4275, 4280, 4285, 4290, 4295, 4300, 4305, 4310, 4315, 4320, 4325, 4330, 4335, 4340, 4345, 4350, 4355, 4360, 4365, 4370, 4375, 4380, 4385, 4390, 4395, 4400, 4405, 4410, 4415, 4420, 4425, 4430, 4435, 4440, 4445, 4450, 4455, 4460, 4465, 4470, 4475, 4480, 4485, 4490, 4495, 4500, 4505, 4510, 4515, 4520, 4525, 4530, 4535, 4540, 4545, 4550, 4555, 4560, 4565, 4570, 4575, 4580, 4585, 4590, 4595, 4600, 4605, 4610, 4615, 4620, 4625, 4630, 4635, 4640, 4645, 4650, 4655, 4660, 4665, 4670, 4675, 4680, 4685, 4690, 4695, 4700, 4705, 4710, 4715, 4720, 4725, 4730, 4735, 4740, 4745, 4750, 4755, 4760, 4765, 4770, 4775, 4780, 4785, 4790, 4795, 4800, 4805, 4810, 4815, 4820, 4825, 4830, 4835, 4840, 4845, 4850, 4855, 4860, 4865, 4870, 4875, 4880, 4885, 4890, 4895, 4900, 4905, 4910, 4915, 4920, 4925, 4930, 4935, 4940, 4945, 4950, 4955, 4960, 4965, 4970, 4975, 4980, 4985, 4990, 4995, 5000, 5005, 5010, 5015, 5020, 5025, 5030, 5035, 5040, 5045, 5050, 5055, 5060, 5065, 5070, 5075, 5080, 5085, 5090, 5095, 5100, 5105, 5110, 5115, 5120, 5125, 5130, 5135, 5140, 5145, 5150, 5155, 5160, 5165, 5170, 5175, 5180, 5185, 5190, 5195, 5200, 5205, 5210, 5215, 5220, 5225, 5230, 5235, 5240, 5245, 5250, 5255, 5260, 5265, 5270, 5275, 5280, 5285, 5290, 5295, 5300, 5305, 5310, 5315, 5320, 5325, 5330, 5335, 5340, 5345, 5350, 5355, 5360, 5365, 5370, 5375, 5380, 5385, 5390, 5395, 5400, 5405, 5410, 5415, 5420, 5425, 5430, 5435, 5440, 5445, 5450, 5455, 5460, 5465, 5470, 5475, 5480, 5485, 5490, 5495, 5500, 5505, 5510, 5515, 5520, 5525, 5530, 5535, 5540, 5545, 5550, 5555, 5560, 5565, 5570, 5575, 5580, 5585, 5590, 5595, 5600, 5605, 5610, 5615, 5620, 5625, 5630, 5635, 5640, 5645, 5650, 5655, 5660, 5665, 5670, 5675, 5680, 5685, 5690, 5695, 5700, 5705, 5710, 5715, 5720, 5725, 5730, 5735, 5740, 5745, 5750, 5755, 5760, 5765, 5770, 5775, 5780, 5785, 5790, 5795, 5800, 5805, 5810, 5815, 5820, 5825, 5830, 5835, 5840, 5845, 5850, 5855, 5860, 5865, 5870, 5875,

